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THE NEW ZEALAND GEOGRAPHER

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New Zealand Geographer

VOLUME VI

April, 1950

NUMBER 1

THE CHATHAM ISLANDS*

R. A. FALLA

THE CHATHAM ISLANDS are grouped about the forty-fourth parallel of south latitude and the meridian of 176° west of Greenwich. Although by this definition they are east of the 180th meridian, their distance east of the New Zealand 'mainland' is only about 500 miles—approximately 536 statute miles from Lyttelton, 480 from Wellington, and still less from Napier. With an area of 375 square miles they are the largest of the outlying groups, and their latitude, climate and surface features have rendered them continuously habitable since the first Polynesian voyagers reached them. In this period their historical significance has been considerable; their economic significance much less so.

In the accompanying sketch map (*Fig. 1*) the disposition of the component islands of the group is shown. Most descriptions restrict themselves to the main island or Chatham proper (*Rekohua*) and to Pitt (*Rangiauria*), but the tiny outliers which once were of importance to Moriori birders and cosmopolitan sealers have retained some significance as refuges for a remnant of indigenous flora and fauna long since wiped out on the larger islands of the group.

GEOLOGY AND PHYSIOGRAPHY

Basing his conclusions on descriptions of rocks collected and described by earlier geologists, Marshall¹ sums up the geological history: 'The presence of schists implies the existence of an old eroded land surface. When this was submerged limestones were deposited. Volcanic action commenced and afterwards elevation took place.

Hector's statements are correct, elevation took place in the early tertiary after volcanic action had ceased. The formation of peat and accumulation of sand has taken place continuously since then.' This may

*Descriptive scientific and historical literature on the Chatham Islands is available in various publications. The purpose of the present summary is to complete a series of general descriptions of New Zealand's outlying islands (see the *New Zealand Geographer*, Vol. IV, No. 2, October, 1949, pp. 127-154) with a condensed account based very largely on the variety of more detailed special studies now available and to which general acknowledgment is here made.

¹ Marshall: *New Zealand and Adjacent Islands*, Heidelberg, 1912. Reference should also be made to J. Hector: 'On the Geology of the Outlying Islands of New Zealand', *Trans. and Proc. N.Z. Institute*, Vol. 2, 1869, p. 183 *et seq.*

be elaborated and expressed physiographically by R. S. Allan's summary² of the physical features: 'The island group in its present form is due to two factors. Immediately after the faulting that blocked out the main masses, Chatham Island appears to have consisted of four isolated islands. The largest of these was the southern plateau which was separated by an arm of the sea from the north central area. The old shoreline followed the west coast of the lagoon from Waitangi to Taupeka. Further in the northeast the Kaingaroa block existed as a schist island, and in the northwest the Cape Pattison area was separated from Maunganui. The next phase probably was a slight uplift, and the formation of the extensive sandbars which now link up these old land masses. Pitt Island seems to be a faulted remnant of a greater Chatham Island, and the fourteen-mile-wide Pitt Strait is clearly a sunken trough, or perhaps an area which failed to rise when faulting occurred. Mangere and Rangataua are but recently separated from Pitt Island. Taken as a unit the Chatham Island group represents but a small part of a formerly extensive land area.'

CONNECTION WITH NEW ZEALAND

As the group is shown by soundings to be included in what is known as the New Zealand plateau, naturally there has been much speculation as to whether a connection with New Zealand existed late enough to influence the flora and fauna. Marine faunas studied by palaeontologists give no conclusive evidence, Marwick, in a study of the Tertiary mollusca,³ pointing out that, while a high proportion of the Chatham Island genera are derived from New Zealand, it is not possible to tell from molluscan evidence whether the islands ever have been actually joined to the mainland. Among the distinctive land animals formerly abundant were several peculiar flightless rails, but it is now recognised that wing reduction in members of this family has commonly occurred on remote oceanic islands throughout the southern hemisphere, to which their original dispersal almost certainly was by flight. The more completely wingless kiwi and moa have not been found at the Chathams.

Conspicuous features of the surface configuration of the main island are the comparatively high block at the southern end, and the vast extent—46,000 acres—of lagoon and lake in the central portion.

²R. S. Allan: 'Chatham Islands: The Physical Features and Structure', *Trans. and Proc. N.Z. Institute*, Vol. 59, 1929, pp. 824-839.

³J. Marwick: 'The Tertiary Mollusca of the Chatham Islands', *Trans. and Proc. N.Z. Institute*, Vol. 58, 1928, pp. 432-506.

For the rest the surface is undulating with extensive sand dune areas adjoining Petre Bay in the west and Hanson Bay in the east. Pitt Island, of about 16,000 acres, is also higher in its southern portion, the peak of Waihere, 971 feet, being the highest point in the whole group. Its

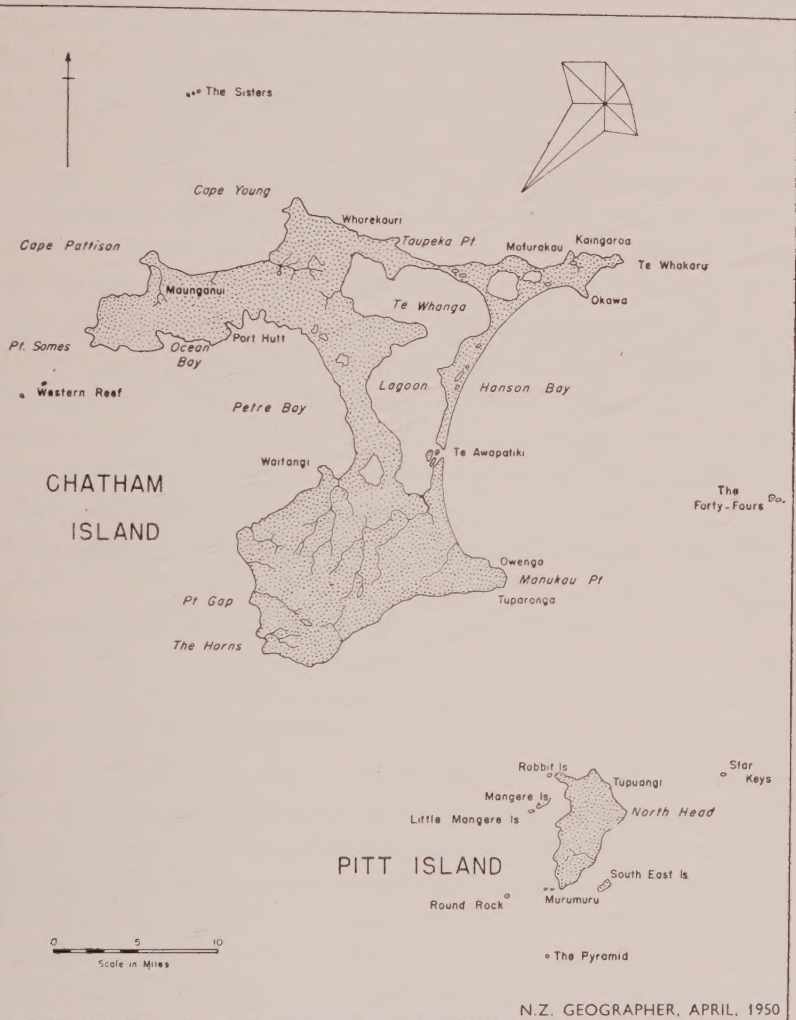


Fig. 1. The Chatham Islands. The windrose is based on annual percentage frequencies.
(With acknowledgment to C. A. Fleming)

coastline is more rugged than is much of the coast of Chatham Island, and its immediate outliers, Rabbit Island, Mangere, Little Mangere and South East Island, are picturesque and varied in outline.

The original plant cover has been so modified in the past century that even the remnants now to be found have been affected by exposure

to wind or farm stock. Consequently, Cockayne, who has given the most complete account of the vegetation,⁴ has divided the plant formations for purposes of description into recent, or modified, and original. He pointed out that two distinct regions can be recognised, the one confined to the tablelands, and the other, or 'lowland' region, comprising all the remainder, but allows that some of the marked differences may be accentuated by the constant firing and grazing and other disturbance to which the lowlands have been subjected. There are true forest associations to be found in both regions, although they lack trees of a size that would be regarded in New Zealand as timber trees; and they lack also the familiar shrubby undergrowth of mainland forest.

In the lowland region there are about ten kinds of forest tree and a nikau palm (*Rhopalostylis*), conspicuous among the former being the kopi (*Corynocarpus*) better known in New Zealand as karaka. In place of the usual undergrowth are tree ferns with other ferns along the ground. The tableland forest on more peaty soil and in a moister atmosphere lacks many of the lowland trees, including the kopi and the palm, and is dominated by a grass tree (*Dracophyllum*). For the rest there are extensive swamp and bog associations, and considerable areas of heath and dune.

Pastoral activities of a century have converted most of the lowland into pasture on Chatham and Pitt Islands, and the cattle and sheep have consolidated much of the swamp and thinned out most of what is left of lowland forest, and some of the tableland forest as well. An almost continuous process, too, is the underground burning of the peat, the collapse of which sometimes forms new lakes, barren hollows and temporary 'clears'. Only one of the Chatham Island plants is markedly endemic, the magnificent blue forget-me-not (*Myosotidium nobile*), usually known as the Chatham Island lily.

ANIMALS

There were no mammals, no amphibians, a few small reptiles (lizards) and a considerable variety of birds in the original land fauna. The forest birds were all modified representatives of New Zealand kinds, but apparently not of the oldest of them. Also, there were numerous waterfowl and ground birds, swans, true crows (*Corvus*),

⁴L. Cockayne: 'A Short Account of the Plant Covering of the Chatham Islands', *Trans. and Proc. N.Z. Institute*, Vol. 34, 1901, pp. 243-255.

oots and rails, all wiped out in Moriori times or soon after by fires or hunting. A few of the indigenous bush birds remain, some confined to the outliers of Pitt Island, but the birds now most numerous are the introduced European small birds, woodhens (*Gallirallus*) from New Zealand and the Australian black swan. Thus has a fauna originally somewhat lacking in variety been replaced by a still more impoverished substitute in an area where no sustained effort has ever been made by man to conserve or reclaim any feature of either the natural landscape or the plant cover.

A wind-direction diagram, based on annual percentage frequencies, is shown on the accompanying map. There are few windless days, and the cycle of a northwesterly spell followed by a swing to the southwest, so familiar to followers of weather broadcasts in New Zealand, has its counterpart in the forecast for the Chatham Islands. In general the southerly has a little more bite and persistence in the Chathams. The oceanic surface temperatures, with other factors, cause passing fog, and low cloud is frequent. The mean daily maximum temperature for a series of years has been recorded as ranging between 67° F. and 60° F. for January and 51.6° F. and 49° F. for July. In general the climate is mild and equable with no intense heat and infrequent light frosts. Rainfall is well distributed at all seasons but has a low annual average, totals varying between thirty to fifty inches from year to year.

THE OCEANIC ENVIRONMENT

Island groups are all too frequently described and discussed without adequate consideration being given to special conditions in their immediate oceanic environment. The set of several currents from New Zealand to the Chathams has been remarked on by palaeontologists discussing the distribution of marine animals, and by Cockayne in his comments on plant dispersal. This situation has been much more fully analysed by C. A. Fleming,⁵ who points out that the Chatham Islands lie on a strongly-defined subtropical convergence, in an area, that is, where southward-flowing currents of warm saline subtropical waters come into direct opposition with cold and less saline subantarctic waters. The two currents have an ill-defined convergence as they flow eastwards across the Tasman Sea, but divided as they reach New Zealand, and reinforced as they pass, one north and one south, they meet again in the neighbourhood of the Chathams. While such a condition

C. A. Fleming: 'Birds of the Chatham Islands, Part I', *The Emu*, Vol. 38, 1939, pp. 380-413.



Fig. 2.
High Cliffs,
South Coast,
Chatham Island

has some influence on climate and indirectly on the terrestrial life, it makes for very rich variety indeed in the life of the sea. There are no precise hydrological data available nor descriptions of the plankton, but the shore life is rich, fish abundant, and plankton-feeding vertebrates such as seals and oceanic birds are in high concentration, not only for feeding but also for breeding on the extreme outliers where they are less molested. The oceanic birds are albatrosses, petrels and cormorants, and they are to be found on the islets known as the Sisters, the Forty-fours, the Star Keys and the Pyramid. Colony-forming penguins of the various crested species seem to be absent, but plentiful bores suggest that they suffered at the hands of the Moriori or early sealers the fate of the great auk in subantarctic seas. Fur seals at the Chathams share the healthy revival of numbers that recently has occurred in southern New Zealand; and the frequent strandings of the smaller whales and dolphins indicate that the offshore waters may be for them a rich feeding ground.

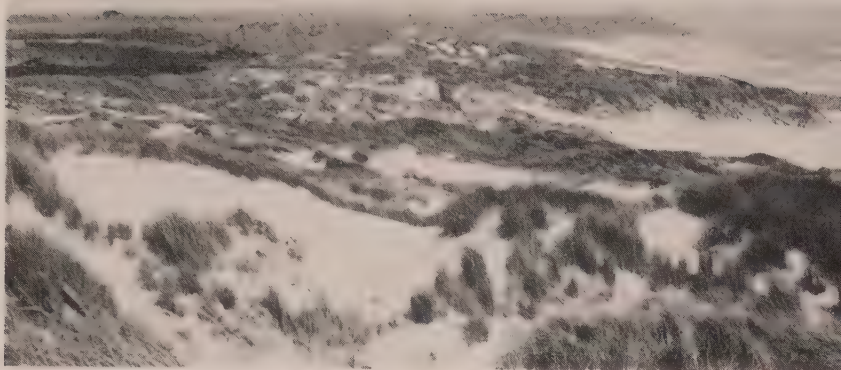
THE PEOPLING OF THE ISLANDS

In the environment just sketched⁶ a succession of human inhabitants have managed to maintain themselves, or be maintained, for just on one thousand years. There is no evidence that any people preceded the

⁶Other general accounts of this environment are provided by E. Dieffenbach: 'Account of the Chatham Islands', *Journ. Roy. Geog. Soc.*, Vol. 2, 1842, pp. 195 *et seq.*; and R. S. Florance: 'Chatham Islands' in *N.Z. Official Year Book*, 1900, pp. 531-539.



Fig. 3.
Upland Forest,
Northern Bloc



J. Williamson

Polynesian immigrants who called themselves the Moriori;⁷ and fairly reliable evidence that their arrival at the Chathams direct from Hawaiki or via New Zealand can be dated between 950 and 1150 A.D. when the earliest Polynesian migrants reached New Zealand itself. It is unfortunate that the term 'Moriori race' has been loosely used in reference to the Chatham Islanders and that the dialect differences of their language have been exaggerated. Apart from the fact that their small community lacked any stimulus to alter a traditional culture pattern and that they lacked also the stimulating infusion of later migrants experienced in New Zealand, there is no doubt that they shared an immediate common origin with the first Polynesians to come to New Zealand. With no scope for expansion in their austere surroundings they had at least to modify part of the traditional pattern of life. As no tropical food crops would grow they ceased to be cultivators and depended on fowling and fishing, with fern root and copi berries as vegetable alternatives. Fishing, as well as birding at the outlying islet homes of the albatross, required canoes. In the absence of suitable large trees for timber, a distinctive raft-canoe was invented, consisting of the buoyant dry flower stalks of *Phormium* lashed and fashioned into a box-shaped canoe. They were easily waterlogged and were propelled by oars.

Decorative arts were restricted to a small range of ornaments and carving which had some affinities with the extinct culture of Easter Island. Stylised human figures, also, were incised in the bark of growing trees and on faces of workable stone. The Moriori must have formed a close-knit and industrious community to have survived as they did; and it is not surprising that one of the customs which tradition records as

See H. D. Skinner: 'The Morioris of the Chatham Islands', *Memoirs of the Bernice P. Bishop Museum*, Vol. 9, No. 1, 1923.

having been outlawed was that of intertribal war, in which so many Polynesian communities were accustomed to indulge.

HISTORICAL

The islands were discovered by Europeans and received their present name when sighted in 1791 by Lieutenant William Broughton in H.M. brig *Chatham* proceeding from Australia to Tahiti to rendezvous with the commander of the expedition, Captain George Vancouver, in H.M. ship *Discovery*. Broughton, who landed and took possession on 29 November 1791, remained only long enough to exchange trinkets for curios, and before he left became involved in some misunderstanding and a skirmish in which a Moriori was killed. The naval expedition was the precursor of the whaling and sealing fleets which invaded the southern Pacific from 1793 onwards, and thereafter the Chatham Islands became a centre of the unregulated industry which has very few constructive results to its credit, except perhaps in London, New Bedford and le Havre.

EUROPEAN PENETRATION

It was toward the close of the first period of profitable hunting that the Chatham Islands, by then well known to many Maori in New Zealand who had served in whaling ships, was selected by a displaced and restless group of Taranaki people of the Ngati Mutunga and Ngati Tama sections of the Ngati Awa as an attractive new home. Their problem was transport. It was overcome by the forcible seizure at Port Nicholson of the trading brig, *Lord Rodney*, and the imposition of terms whereby the master agreed to give them passage to the Chathams. The small vessel conveyed some nine hundred men, women and children, with personal belongings and muskets, in two trips, in 1835. For this invasion, the Moriori, of whom there were estimated to be about 2,000, were unprepared and did not resist it. They were subjected first to slavery and then to summary slaughter, for they were not very satisfactory slaves and there were too many people, anyway, for the food resources of the islands. The invaders themselves soon became involved in intertribal strife and the blood-lust engendered was indirectly the cause of the massacre of the crew of the French whaler, *Jean Bart*, in 1838. The internal war was still in progress in 1839 when Wakefield's New Zealand Company, completing its purchase of Port Nicholson, decided to negotiate for the Chatham Islands as well. This

they did by treating with the Ngati Mutunga, who had the Ngati Tama besieged in Waitangi, and then transporting the defenders to another part of the island. The sale, however, was declared by Crown law decision to have been illegal, and the islands came under British sovereignty by letters patent in 1842.

The year 1840 also saw the arrival of Frederick Hunt, the first enterprising British settler, and in 1842, a Church of England mission was established. This was followed by other missions, including a strong group of German Lutherans, and the setting up of a civil administration to deal with law and order in everyday affairs. Pastoral runs were taken up and a steady trade developed with New Zealand and Australian ports. Since 1900 this has declined, although in this period fishing for export has been added to the regular island industry of farming. The population has varied between 700 and 500 and inhabitants of European stock never have exceeded those of Maori or part-Maori blood. The dwindling line of pure Moriori, or, more properly, the unmixed descendants of the pre-1835 people, became extinct with the death in 1933 of Te Rangitapua, better known as Tommy Solomon. His people, although numbering about 100 when freed from serfdom in 1865 and given their own land holdings in 1870, became gradually merged by intermarriage and remained a steadily declining minority to the end.

The last notable act of violence in the history of the Chatham Islands was the daring seizure by Te Kooti and some fellow prisoners of the schooner *Rifleman* in 1868. As insurgent members of the Hauhau sect they had been sent to the islands for safe imprisonment, but their escape was successfully carried out and they landed on the Poverty Bay coast to commence another era of tedious warfare.

The islands also have a long chronicle of wrecks, of eastbound sailing ships that struck in thick weather, and of local craft dragging and going ashore in heavy gales.

THE PRESENT DAY

The later history of the islands involves a study of economic and social factors which cannot be covered by this summary. They have been touched on and presented concisely in F. A. Simpson's *Chatham Exiles* now in the press and some quotations for which the author is indebted to Mr. Simpson will be found in what follows.

The principal stable industry of the people since the middle of the

nineteenth century has been farming, but its development has not been without much setback. The stimulus given to the Maori people in 1842 by their far-sighted leader, Pomare, was not maintained for long. The custom of vegetable growing for the dwindling whaling fleets was not easily changed for the new technique of caring for stock, and except for superfluous horse breeding, few of the Maori at that time became good farmers judged by competitive standards. Original European settlers, however, had some success with sheep, and their numbers were augmented by newcomers with mainland experience who took up large holdings. The islands soon acquired and maintained a reputation for healthy stock, a condition which has helped somewhat to offset the crippling costs and risks of transport to markets. In his recent summary of this aspect of island life, F. A. Simpson has recorded that 'the largest farms average between 7,500 and 10,000 [acres] and there are another three averaging between 5,000 and 7,500 each. Five medium-sized units are carrying from 2,500 to 5,000 sheep, seventeen have between 1,000 and 2,000, and twenty between 500 and 1,000. Of the remaining sheep farmers twenty-three have between 200 and 500 head, and there is another group of eighteen small holders with up to 200 sheep each. The combined number of sheep on Chatham and Pitt is in the vicinity of 121,000, the great majority of which are Romneys.' Freight and incidental charges in marketing sheep at the time of writing are about ten shillings a head, and about £10 a head for cattle, of which several thousand are however kept and pastured in the Chathams.

The fishing industry would seem to offer some possibility of steady development. Reporting on it in the 1920's, Maxwell W. Young states that the waters of the Chatham Islands are literally teeming with blue cod (*Parapercichthys colias*) and other first-class fish.⁸ In good weather it is not uncommon for one boat manned by two fishermen to catch one ton green weight of blue cod in a day. Various methods of transport to markets have been tried, including frozen storage at the islands, and at the present time a capacious fishing vessel runs regularly between the Chathams and Wellington. There is little doubt that when basic research and survey of fishing grounds throughout the whole New Zealand region catches up with the random experimental exploitation still going on, the Chatham grounds will be an important factor in an important industry.

In general, there has been remarkably slow development of the

⁸M. W. Young: 'Marine Fauna of the Chatham Islands', *Trans. and Proc. N.Z. Institute*, Vol. 60, 1929, pp. 136-166.



Fig. 5. Typical Lowland Farming Area.

Photo: J. Williams



Fig. 6. Waitangi Township, 1937.

Photo: C. A. Fleming

Fig. 7. Chatham Island Transport, 1937.

Photo: C. A. Fleming



public services and domestic amenities which are taken for granted by the mainland New Zealander. For this state of affairs early official neglect may be in part responsible, but it owes something to an isolationist lethargy or 'islanditis' in a large part of the population. A long-standing difficulty in collecting any form of levy or rates resulted in 1937 in the institution of a special surcharge on imports and exports as an alternative means of raising revenue for public services. Even then the maintaining of some of them proves expensive and difficult. Hospital and medical services have been available since 1927, but qualified medical officers have never stayed long; and the difficulty of keeping trained nurses there has recently resulted in this responsibility being taken over by members of a religious order. Apparently, there has never been enough local interest to support even a typewritten newspaper, but there survive as collector's pieces some issues of short-lived handwritten journals, a weekly in 1867, and a monthly in 1904. The editor of the *Chatham Island Chronicle* of 17 August 1867, remarks: 'In a small community there is always felt a want of excitement, whereby people are led into a state of lethargy and indifference, and it is partly on this account that we have been induced to commence this little periodical.' It is not recorded if he succeeded, but the success if any seems to have been transitory.

In matters of communication the main island has had the benefit of radio telegraphy since 1913. Shipping services have been hard to maintain at reasonable standards of regularity and of suitable accommodation for passengers, livestock and perishables alike. The facilities for flying-boat moorings make it possible for officials to visit the group and for islanders to obtain emergency transport more easily, but the service is not regular. The wharf at Waitangi, although not usable in all weathers, has led to improved cargo handling since 1934, and the construction of twenty-nine miles of road by the Department of Works will in time modify the traditional traffic through sand or mud by horse, bullock and 'jogger'.

Their ability to meet domestic needs by their own efforts has tended to make a large number of the islanders content with standards which could be much improved by some local effort which would serve as an active concomitant to the passive acceptance of the many services now provided from government funds. This problem, however, is one for economists and sociologists, and discussion of it would be out of place in a descriptive article.

A LAND DESPOILED: NEW ZEALAND ABOUT 1838*

KENNETH B. CUMBERLAND

THE REPORTS and maps of New Zealand furnished by Captain Cook and his scientific companions — especially Banks and Solander—proved to be good publicity for these hitherto undescribed lands in the southwest Pacific, and Cook was followed by a succession of British, French, Spanish and American voyagers. Meanwhile the permanent settlement of New South Wales had been established, and with the augmentation of the colony by selected immigrants, it had by 1790 attracted eager merchants whose vessels linked Port Jackson in trade with China and India. Enterprising traders were already exploiting the resources of Bass Strait. The reports of good timber, abundance of seals and excellent anchorages in New Zealand were sufficient to direct the attention of the Port Jackson traders across the 1,200 miles of stormy ocean and to stimulate them to explore the possibilities of a trans-Tasman trade.

A half century of destructive exploitation of New Zealand's accessible (and especially coastal) resources, both natural and cultural, was inaugurated in 1792 when William Leith, second mate of the *Hermes*, a convict transport, was left at Dusky Sound, in November, 1792, in charge of a sealing gang of forty men and a carpenter. However temporary in plan or outcome, this is the first recorded settlement of Europeans in New Zealand. Three years later, under the auspices of the East India Company, the *Fancy* lifted '213 Kahikatea and Matai spars' from 'some miles up the small fresh water river' (the Waihou), and took them from the Thames via Norfolk Island to Port Jackson. Exploitation had commenced both in the far north and the far south where it was mainly to be concentrated during the next fifty years.

This essay in historical geography follows a chorological and not a chronological viewpoint. It is an attempt to describe 'the existence together' of phenomena (both physical and cultural) in a certain area at a past period of time. Historical geography is interpreted as the geography of an earlier 'period' and as theoretically the counterpart of the history of a *foreign* 'region'. The emphasis is not thrown on the chronological sequence of events in New Zealand between 1792 and 1840 though reference to some of these is imperative. Rather the aim has been to describe the life and landscape of New Zealand towards the close of this period and, insofar as possible, to assess the character of different regions within the country. The essay is one of a series and should be read in conjunction with one already published. (See Kenneth B. Cumberland: 'Aotearoa Maori: New Zealand about 1780', *Geogr. Rev.*, Vol. 39, No. 3, 1949, pp. 401-424.)

By 1810 the coast of Murihiku from the fiords round to the volcanic pile of Otago Harbour was studded with the temporary shelters and store sheds of sealing gangs; almost every inlet on the stormy and uncertain coast was the scene of recklessly efficient killing. Foveaux Strait had been discovered and all the off-lying islands explored in the search for the seal rookeries. Not only the Port Jackson merchants but also their counterparts in Boston and Salem had planted gangs on the Snares, the Antipodes and the Bounties. The American-operated *Favorite* came into Sydney in 1806 with a cargo of sixty thousand sealskins said to have been collected on the New Zealand coast. In a single week in 1810, imports of sealskins into Sydney realised a sum of more than £100,000. Yet, although no less an authority than Sir Joseph Banks claimed that the rocky coastal habitat of the seals had remained unmolested for centuries with the result that 'the beach is encumbered with their quantities' and there was 'less trouble in killing them than . . . [in slaughtering] hogs in a pen with a mallet', by 1810 the rookeries had been almost exterminated on the mainland coast of Murihiku. Just as the final near-destruction of the seal fisheries of Bass Strait had diverted attention across the Tasman, so the ruthless extermination in southern New Zealand forced the sealers to the still wilder and more perilous coasts of the Chathams, the Campbell Islands and Macquarie.

Meanwhile more and more schooners were trading on the New Zealand coast and visiting especially the warmer bays of the far north where the higher density of the Maori population made for a greater variety of available export products and supplied more labour for their preparation. Some trading vessels continued to touch the southern shores picking up quantities of flax, potatoes, pork, timber, firewood, pickled oysters and occasional bundles of sealskins, until with the advent of the shore-whaling establishments in the late 1820's the southern coasts were again studded with European settlements, this time of more permanent character.

WHALING

The Bay of Islands had already become a refitting and victualling depot for pelagic whaling vessels scouring the southern ocean for the sperm or cachalot whale. They are recorded as fishing off the northernmost coasts of New Zealand and as frequenting the Bay of Islands as early as 1794. In the next fifty years, New Zealand became a favourite resort for motley whaling crews from Port Jackson, Hobart Town,

England, the United States, the Atlantic coast ports of France and Portugal, and from Holland. In 1839 there were thirty-seven whaling vessels out of United States Atlantic ports—New Bedford, New London, Newburyport, Poughkeepsie, Sag Harbour and the rest—on the New Zealand coast. By this time however they were chasing the right whale within sight of the rugged coast. Sperm whales had been badly reduced in number, and the demand for the black oil of the right whale and for whalebone had, since 1829, brought the whalers into the bays which the right-whale cows visited to calve. Pelagic whaling was thus replaced by bay and shore whaling and the industry which had formerly belonged to the ocean became a New Zealand enterprise. At first whales were reported to be ‘tumbling over each other like porpoises’ and for twenty years the industry prospered. While foreign whalers anchored in the bays and conducted their activities from the mother ship, Australian capitalists established permanent shore settlements from which the whaleboats operated, where the processing of the oil was carried out and at which a succession of trading vessels called to revictual and to lift the precious oily cargo.

BEACHCOMBERS AND MISSIONARIES

Two other immigrant groups helped to determine the eventful course of history and the individual character of the different parts of the New Zealand region in the first half of the nineteenth century—the ‘beachcombers’ and the missionaries. Once the use of metal tools had been seen by the Maori tribes, a demand grew for both the tools themselves and for pakeha Maori who would demonstrate their use. A succession of nondescript trading vessels visited the sheltered bays and estuaries of the northern peninsulas and brought not only the implements of peace but also the tools of European war and a whole lot of commodities that might have been carefully contrived to bring the Maori people to physical, social and moral destitution. They left agents ashore to organise the collection of pigs and potatoes, the preparation of flax, the felling of spars and rickers and, no doubt, to excite the demand for muskets, powder, cartouche boxes, bullet moulds, fishhooks, clasp knives, tobacco, axes, blankets and rum, the Maori’s best-won favours from overseas trade. These agents were reinforced by deserters and shipwrecked seamen, by the remnants of abandoned and forgotten sealing gangs and by escaped convicts who stowed away on vessels from Port Jackson and Norfolk Island—a motley crew of

'gentry admirably qualified to spread the vices of civilisation and discredit its precepts'.

The missionaries came in part with the object of countering the injuries already done to the economy, social organisation and morals of the Maori; but, however good their intentions and however high the courage of individuals, they soon came to constitute yet another disruptive element in the years between 1814 and 1840. While they fought against war, discredited cannibalism, and abolished slavery, and while in their schools they instructed the younger generation and made Maori a written language, they helped to undermine the traditional efficacy of the well-organised social and economic life of the natives, to destroy their ancient agricultural practices, to undermine long-ingrained habits of labour and self-restraint, to disrupt the authority of chiefs and, through the introduction of rival creeds, to break down the tight-knit social patterns and respect for authority within families and tribes. Even Marsden's original expedition in the *Active* in 1814 might be cited as having a significance greater than its proclaimed bringing of 'good tidings of great joy', for the bluff and rotund Yorkshireman purchased 200 acres of land in the Bay of Islands for twelve axes and returned to Paramatta with a cargo of spars and dressed flax to the value of £450.

The decade immediately preceding the establishment of organised settlement is perhaps most representative of the destructive exploitation of the half century after 1790. By that time sufficient disruptive agencies of different sorts were at work in different areas for sharply-contrasting habits and habitats to fashion distinctive regional individuality. There were three regions of Maori-European contact—northern, central and southern. The rest of the North Island retained many of its Maori people and much of its traditional life and landscape. Most of the rest of the South Island remained largely unoccupied by the Maori, and unseen by European eyes.

THE MAORI IN DECLINE

In the 1830's the Maori people outnumbered the immigrant and temporarily-resident pakeha by not less than 150 to one. There may well have still been 130,000 of them. Dieffenbach reported a Maori population of 114,890 in 1841. In the sixty years after 1780 it is not improbable that the Maori people declined in numbers by two-thirds. The visit of many an explorer's vessel, no matter how fleeting, was

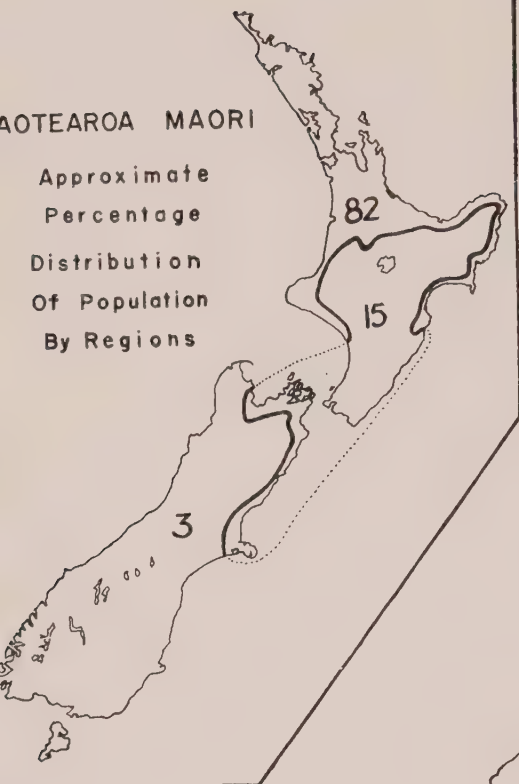
followed by an epidemic of some strange disease which the Maori regarded superstitiously as akin to the *makutu* or black magic of the *haka*: he succumbed almost as often to the psychological disturbance of mind that followed the rampage of disease as he did to the disease itself. Such visitations became more numerous with the increase in the number of trading vessels touching the coast and spread rapidly to the interior of the country. The numerous tribes of the North Island—Tairāwhiti—the Arawa at Rotorua, the Tuwharetoa on the bleak shores of Taupo and the remote Tuhoe in the forested ranges of the Urewera—suffered but little less than littoral tribes. Colenso reported how even small and completely isolated subtribes of inland Patoka, not actually visited previously by Europeans, were stricken by strange diseases and decimated, certain villages being completely depopulated between successive visits by the missionary explorer only a few months apart. No estimate has been made of the toll of Maori life taken by measles, venereal disease, influenza, tuberculosis and the other maladies brought by the early pakeha. In any case, it would have to be expanded to include the loss of life brought about by the disruption of ancient dietary habits and the introduction of tobacco and alcohol, and of flour, sugar, and other strange foodstuffs, which caused digestive troubles and reduced resistance to disease until such time as the Maori gradually became accustomed to the new dietary combinations. It has, however, been estimated that in the generation preceding 1840 tribal warfare reduced the Maori population by half; and for the enhanced efficiency of warfare in this period the European was directly and indirectly responsible. Not only was the general disturbance of Maori life and economy largely responsible for the migrations of the tribes and for the intertribal antagonisms generated in the 1820's and 1830's, but in supplying the native warriors with muskets and powder the Europeans helped to transform what had been a ferocious manly exercise and sport into something more ruthless and sinister, and much more potent in dealing death. What were formerly localised skirmishes, became large-scale wars of extermination.

WARFARE TAKES ITS TOLL

Hongi, the first of the renowned musket-armed chiefs of this generation, took slaughter and rampage from the Ngapuhi territories of the north to the Hauraki, the Waikato, Rotorua, and into the tribal lands of the Ngati Porou on the east coast. Te Waharoa put an end

AOTEAROA MAORI

Approximate
Percentage
Distribution
Of Population
By Regions



DISTRIBUTION of MAORI POPULATION of AOTEAROA

1780

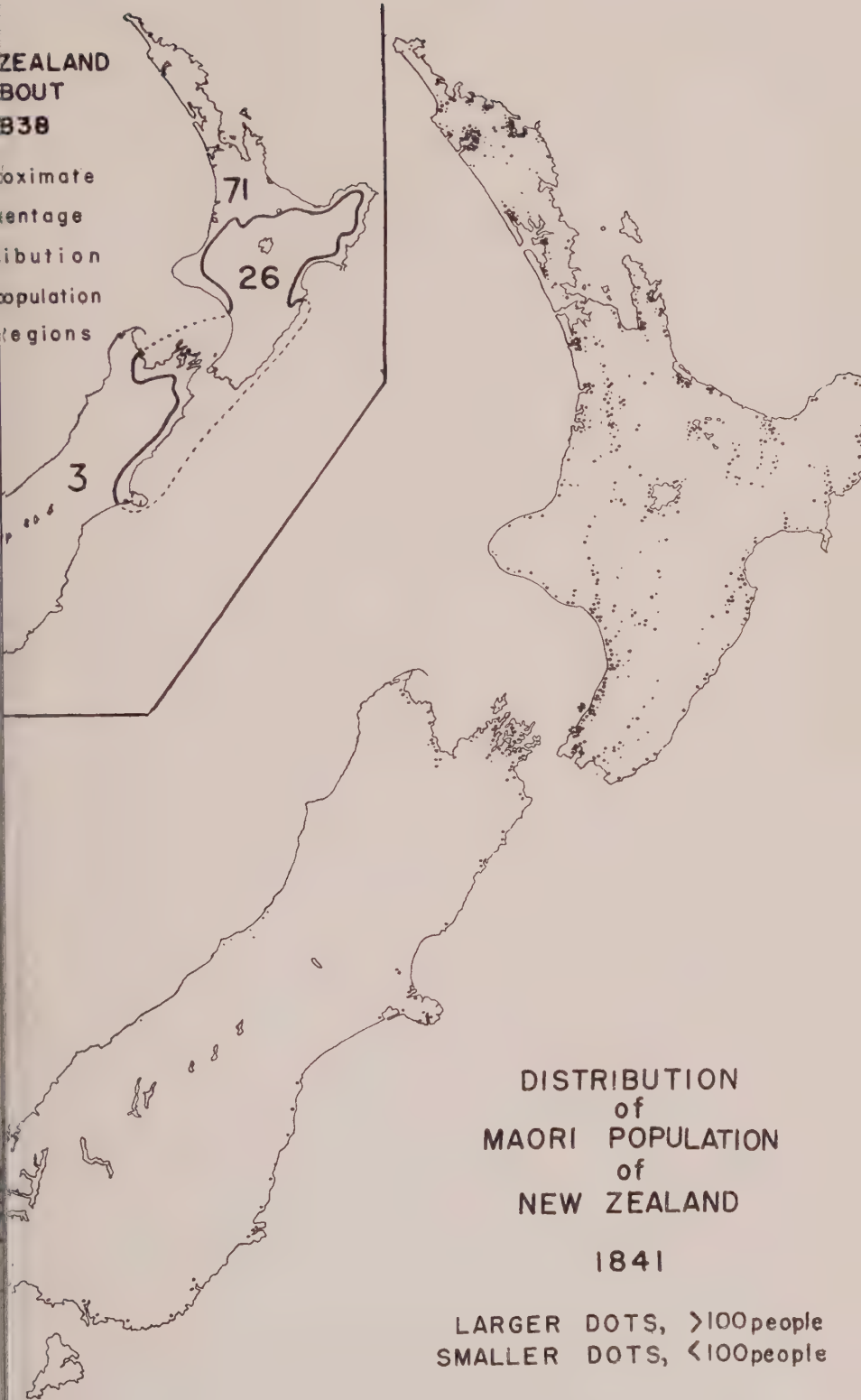
DOT UNIT TO BE ADJUSTED
ACCORDING TO ESTIMATE
OF TOTAL POPULATION

	COOK 100,000	BUCK 400,000
•	500	2,000
•	200	800
•	50	200

Fig. 1. Distribution of Population, 1780.

ZEALAND
BOUT
B38

roximate
centage
tribution
population
regions



DISTRIBUTION
of
MAORI POPULATION
of
NEW ZEALAND

1841

LARGER DOTS, >100 people
SMALLER DOTS, <100 people

(total population after
Dieffenbach, 114,890)

N.Z. GEOGRAPHER, APRIL

to the depredations of the Ngapuhi with a force whose canoes 'blackened the sea' and spared only two of the opposing war party. No one who has read the account of the defence of Ngamotu pa in 1832 and of the carnage inflicted by Te Wherowhero and the Waikato-Maniopoto tribes on the residue of the Taranaki people at Pukerangiora, Waitara would remain unconvinced of the validity of claims which suggest that such slaughter, occurring from Kaitaia to Kaiapohia and reinforced by disease and deficient diet, together with the local fighting between coastal tribes and European whaling and sealing parties as far south as Murihiku, diminished the numbers of the Maori people to a mere remnant of their pre-European magnitude.

The wars of musket against wooden spears and stone clubs were generated in the northern region, especially in the Bay of Islands and the Hokianga. Here trade first developed, and here the Maori first became acquainted with European firearms. As tribes acquired the weapons by dint of guile, robbery and monotonous and frenzied toil, the unequal warfare was carried south. Te Rauparaha, the foremost Maori chief of his day and generation, recognising the threat and appreciatively aware of the strategic value of having control of some territory that afforded the opportunity of contact with Europeans in general and traders in particular, persuaded his followers to migrate from Kawhia to the hitherto insignificant and relatively unattractive territories bordering Cook Strait. This was in 1819. Te Rauparaha was especially impressed with the strategic value of Kapiti—off-shore island, steep, secure from land attack, the resort of whalers and trading schooners and jumping-off place for the island of greenstone. He soon had command of both sides of Cook Strait, hitherto sparsely occupied by less able tribes. His exploits attracted tribes related to his own and there were further migrations from Taranaki and other territories threatened now by the Waikato people. After Te Wherowhero had butchered the remnants of the Taranaki tribes, the tract of valuable land between Mokau and Patea remained virtually unoccupied until the barque *Wm. Bryan* arrived with immigrants from Devon and Cornwall nine years later.

REDISTRIBUTION OF MAORI POPULATION

By the mid-1830's Maori population was not only much reduced in number but much changed in patterns of distribution. An attempt

has been made to represent cartographically the distribution of both Maori and pakeha population at this time. If Figure 1 is compared with Figure 2 it will be seen that while internecine struggle before 1840 had much reduced the concentration of population in the north, obliterated the 'urban' agglomerations of people about the Tamaki isthmus and depopulated the littoral of northern Taranaki, the interior tribes of the upper Waikato, Waipa, Rotorua, Taupo, upper Wanganui and Urewera regions had preserved more of their earlier numerical strength, despite local coastward migration in response to the attraction of European settlement and the new facilities for trade. Most numerous in the 1830's were the Ngati Kahunguna, Ngati Porou and related tribes along the length of the eastern littoral, cut off from external contacts, apart from occasional whalers, until Williams and Colenso brought the gospel to Turanga and Ahuriri and sheepmen brought their herds into the Wairarapa. Two other coastal areas, both small, now accommodated a larger proportion of the Maori population than they had at any earlier period—the coast from the Manawatu to Porirua and the offshore islands of Kapiti and Mana, and the indented littoral across Cook Strait—especially about Queen Charlotte Sound, Tory Channel and Cloudy Bay. After Te Rauparaha had carried warfare and siege to Banks Peninsula and Kaiapohia, and the sealers and whalers had disrupted the life of the Ngaitahu in Murihiku, the population of the South Island as a whole was reduced in much the same proportion as that of the North Island.

THE DISRUPTION OF AN ECONOMY

Nor were the other outcomes of European contact—the changed economy of village life and the material things that came from trade and commerce—compensation for this era of slaughter and of death from epidemic disease. Cook had sown the seeds of change. When he introduced the pig and potatoes he took the first steps in a process that by the 1830's had completely transformed the economy and life of all but the isolated inland tribes of the North Island. Colenso reports that even in the barren lands that lie southwest of Lake Taupo and in inland Patea the people were harvesting potatoes the size of peas. Just as *pounamu* dwindled in value beside rusty iron hoops, so the potato ousted taro, uwhi and gourds and later, with maize, reduced the acreage and the economic and dietary significance of the kumara: and

pork replaced the flesh of birds and made unnecessary all the skill, energy and organisation that went formerly into the catching of the wildlife of the forest.

With the advent of the trader and the muskets, blankets and grog he brought, the orderly and well-timed conduct of agricultural, fishing and bird-snaring activities soon decayed in more accessible regions. It became necessary to obtain muskets to survive. To do this the Maori of the north abandoned his breezy hill fortification and the tidy cultivations around. In the northern peninsulas he moved nearer to the coastal points at which the traders touched, especially the coastlands of Maunganui, the Hokianga, the Kaipara, Whangaroa and the Bay of Islands. He built temporary whare alongside the estuarine flax swamps or in the damp littoral stands of tall timber. His life became a fervid struggle to fell kauri and transport giant logs or to scrape flax with shells and to prepare ton after ton of fibre, each of which would probably add one rusty musket to the tribal store. Crops, apart from the potato, which largely looked after itself, were neglected. There was little time for fishing. Diet became a succession of potatoes, which were often eaten after prolonged soaking in water had rendered them putrid. Occasionally a pig was also slaughtered, although salt pork was another item that would buy muskets. Cannibalism persisted. The tribe with the muskets had the better chance of adding human flesh to the diet.

A COMMERCIALISED ECONOMY

In Murihiku the formerly migrant population settled down alongside the whaling stations and grew potatoes and reared pigs which they traded to visiting ships for axes, nails, iron or for cash which the southern Maoris quickly spent in the 'taverns' at the whaling stations. Potatoes of excellent quality, pork, salt fish, flax, 'pine timber' and tattooed heads were also traded and exported. The economy of the Maori people between Preservation Inlet and Moeraki became thoroughly commercialised. The native population of these southern shores was for a time far greater than it had ever been and, for the first time, the Ngaitahu became agriculturists with the introduction of and demand for the potato. This crop in fact grew better here (and on the Rangitikei) than it did in those milder and more northerly areas where the kumara and taro had been extensively cultivated. In the outcome, however, the culture contact was as disastrous here as in the

orth. Tuawaiki regarded the drink and disease of the pakeha as an enemy worse than Te Rauparaha and before them his people 'melted away'.

With the decline in Maori population, the distant and local migration of the tribes, the abandonment of older pa and *kainga* and the forsaking of kumara plantations and crop gardens, much of the countryside took on a new appearance, quite apart from the growth of new and partially European settlements. Not only was the fern and manuka allowed to invade the formerly cultivated lands in the northern bays region, but weeds and second growth rapidly overran abandoned settlements and gradually masked the evidence of earlier occupation. Flax was in many places planted and cultivated, even on elevated plateau ridges two days' canoe journey up the Wanganui river. Flax that grew indigenously in coastal and interior riverine swamps was cut until the resistance of the plants was exhausted. Timber was felled and forest cleared in many parts of the north as is indicated by Cruise, Earle, Nicholas and other early sojourners. Elsewhere the thinner forest and wide stretches of scrub were burned to the same way in many places for extensive but untidy cultivations of potatoes and maize. Dieffenbach is not the only visitor, however, to indicate that in many places—both in the northern bays and the parts of the North Island affected only indirectly by European contact—low-lying flats and plateau surfaces were blackened by fire for no apparent economic end. The indication in these cases is that the revolution, affecting first material things, soon came to affect the tapu-regulated conservation of resources and the tapu-organised systems of agriculture, bird-snaring and fishing, just as it undermined the *mana* of chiefs and *hunga* and of craftsmen in the traditional arts of building, carving and tattooing.

SETTLERS

Meanwhile, in certain localities the landscape was moulded more directly by European hands. The foreign population resident in New Zealand in the early 1830's totalled less than 1,000 and, with the exception of a few isolated inland mission stations, settlement took the form of coastal villages associated with specialised whaling activities or of loose, straggling and disorderly settlements of traders, pakeha Maori, beachcombers and temporarily-resident escapees from penal settlements, deserters from whaling ships and curious visitors.

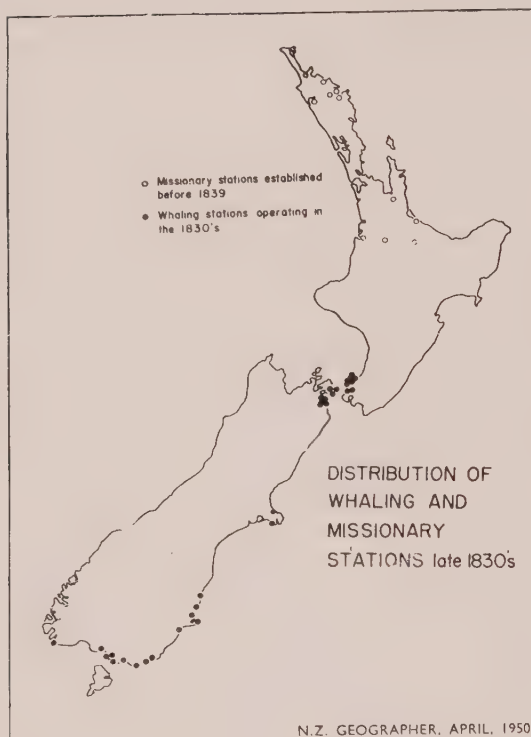
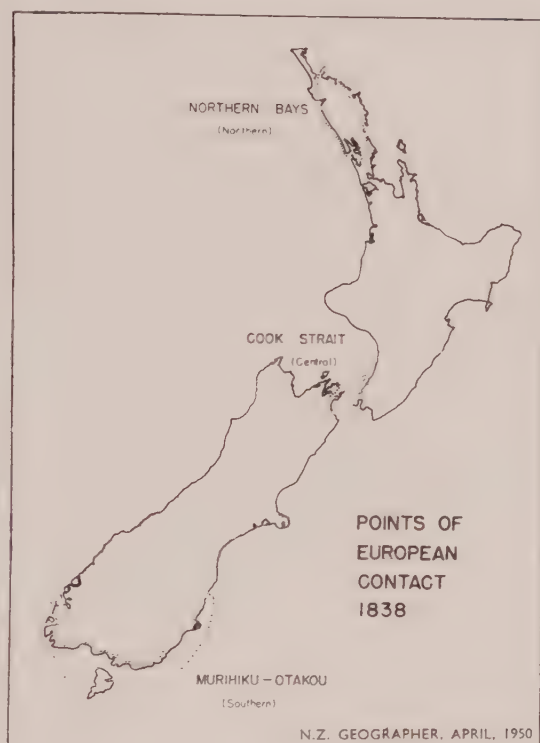


Fig. 3. Whaling and Missionary Stations. It will be noticed that the whaling stations clustered mainly about Cook Strait and along the coast of Murihiku. They are listed in a footnote on page 26. By the late 1830's, missionary stations had been established as far south as Kawhia and Tauranga and missionaries were active in the interior as far south as the northern fringe of the Volcanic Plateau.

The largest of these nondescript coastal accumulations of immigrant folk was Kororareka in the Bay of Islands, but there were many hamlets of two or three huts and houses built for Europeans at different places on the coast convenient for conducting trade with the different tribes and appropriately distant from points where legal authority might one day be established. The population of the whaling stations was temporarily swollen during the whaling season by the crews of trading schooners and of foreign whalers seeking doubtful pleasures ashore, and Kororareka always had a considerable itinerant population from the almost constant flow of whaling and other ships that put into this favourite revictualling and 'recreational' centre. Colenso's records indicate the frequency with which people were arriving and the variety of visitors more especially from trading vessels but also from whalers and occasional naval vessels putting into either the Hokianga or the Bay of Islands. In 1838, Kororareka had itself a

Fig. 4. Points of European contact, 1838. The close coupling of centres of different forms of European activity make possible the recognition of four geographic regions. Three are dominated by European activity and by the complete disruption of the ancient Maori life and landscape. The rest of the country constitutes the fourth region. In general character and appearance it is much as it was in Cook's



population of over 1,000 and on one occasion thirty-five large whaling ships were counted as they lay off its beach.

Although it was the most frequented centre in New Zealand at the time, the Bay of Islands served no clearly-defined function as did the whaling stations. It was the main base of the missionaries, and probably the most active and cosmopolitan trading centre of the period, but its character derived principally from the contrast which existed between the natural physical beauty of its many bays and landscapes on the one hand and the cultural ugliness of the life and habitations of Kororareka on the other. The native-type dwellings, the dilapidated European-type shacks, the trading shanties and stores, the rum-shops and one-roomed 'taverns' and the untidy cluster of overpopulated, badly-constructed whare of the Maori who shared the orgies of the Europeans—these constituted the formless town of pleasure-seeking, haggling and crooked trading and barter, vice in

many forms, noise, tumult and occasional murder constituted the life of the place.

THE WHALING STATIONS

The smaller, specialised settlements of the 'knights of the harpoon and companions of the rum-barrel' from Kapiti to western Murihiku formed a striking contrast. Fortunately they have been very adequately described by Wakefield, Dieffenbach, Shortland and others who visited them at the time. Their distribution is indicated in Figure 3. They were located on the coast as close as possible to the shallow waters frequented by the cow whales at calving time, and the whalers fixed the site of the station according to the facilities and shelter it offered for their shore establishment rather than for its suitability for their residences. The eastern coastal stretches of the extremities of the South Island offered the best facilities, and with few exceptions the whaling stations were found clustered along the Murihiku littoral opposite Stewart Island, on the southern shore of Cook Strait and at Mana and Kapiti Islands.¹

The tryworks constituted the centre of each of these shore-whaling settlements. On the beach a tall scaffold was erected; and during the winter, from April to October, the carcase of a right whale was usually to be seen strung up on the 'sheers' by windlass and tackle. Alongside were the iron trypots in which the blubber was boiled. To left and right were the boatsheds, for possibly as many as a dozen whaleboats, the cooperage, the cook house and store sheds. Beyond them, and in contrast to the spick and span order of the buildings, rows of oil barrels and gear, was an untidy spread of the remains of whales—skulls, vertebrae, rotting fins and shoulder blades—and all around was the stench of oil and of the 'scragg' burning beneath the trypots. The whalers' houses were arranged on the slope inland from the factory

¹On the southernmost coast of the South Island there were fourteen whaling stations in the mid-1830's. They were located between Preservation Inlet at the western entrance to Foveaux Strait and Moeraki on the coast of North Otago: from west to east they were Preservation Inlet (the oldest), Jacob's River (Aparima or later, Riverton), Oue and Omaui (New River), Port Macquarie (Bluff, Awarua), Toi-tois (Mataura), Waikawa, Tautuku, Matau (Molyneux), Moturata (Taieri), Otakou (Otago Harbour), Purakanui, Waikouaiti and Moeraki. In the late 1830's there were two stations on Banks Peninsula at Peraki and Port Cooper (Lyttelton Harbour). The central districts about Cook Strait accommodated another fourteen stations: there were shore establishments at Ocean Bay (2), Kakapo, Tom King's Bay and just inside the eastern heads, Port Underwood (Cloudy Bay); Te Awaiti (2) and Jackson's Bay (Tory Channel); two on the mainland about Porirua Harbour opposite Mana Island; Evan's Island, Mayhew's Island and Kapiti Island (2). At a later date, shore stations were in operation at Kaikoura, Palliser Bay, in Taranaki, at Rangaika and Putotaranui immediately south of Cape Kidnappers, on Mahia Peninsula and the coast north thereof.



Illet's Whaling Station, Kapiti Island, 1844—a painting by J. A. Gilfillan showing the (on the right), the irregular cluster of houses and the whaling grounds between the mainland beyond.

ING STATIONS

om's Whaling Station, Porirua—a close-up view of the whaler's thatched cabin. Notice rks, trypot, the oil barrels and the Maori squatting on the ground.



centre. On the larger and more efficiently operated stations the houses had been well and solidly built of timber with thatched roofs. The one room was lined with bunks; at one end was an enormous chimney, the floor was studded with joints of a whale's backbone which were used as stools; hams, bacon and fish were cured in the open chimney and the rafters were hung with coils of rope, sails and harpoons. In other and smaller whaling settlements the huts of the whalers were described as grass huts and were built by the Maori, but these were the stations to which the whaling gang was usually brought out each season from Port Jackson.

At Otakou, Te Awaiti and Kapiti, large and efficient stations were operated, and the gangs were composed mainly of men who had been on the coast many years, often having turned to whaling after the supply of seals was exhausted. They had Maori wives and half-caste families, lived a life of great exertion during the season and of ease during the remainder of the year, with liberal bouts of grog all the time. Many left the station during the off-season and took up residence in the native pa from which they had earlier taken their wives. Here they organised the production of pork and potatoes which they sold when the opportunity offered, such as was the case when American whalers or Port Jackson traders put in to the station.

DOMESTIC ECONOMY

Each station consisted of from ten to forty cottages. At Te Awaiti there were forty whalers, each with his Maori wife. Other stations had fewer European employees, and much of the work, both on the whaleboats and at the trying-out vats, was done by the Maori. Around many of the settlements the whalers grew their own European vegetables or were able to obtain their supplies from the Maori people who, attracted by the blankets, iron and hard liquor available at the stations, came to live in their neighbourhood and on the adjacent coast where they could take part in the trade that was conducted at the stations.

In all there may well have been 500, including Maori, employed on the stations before the number of whales and the price of oil both began to decline in the late 1830's. In 1836, George Weller reported that Sydney was 'Black Whaling mad'; and, the following year, he estimated that the London price for oil would be £50 a ton and for

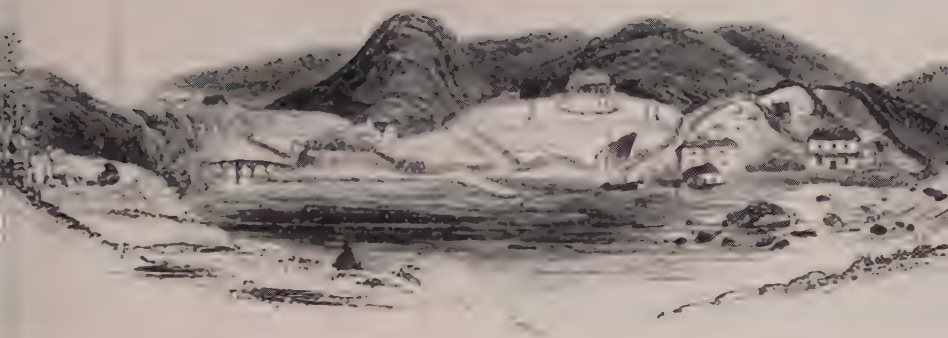


Fig. 7. The Kerikeri Mission Station about 1835.

Fig. 8. Paitua, Church Missionary Society Station in 1857



bone £180 a ton. In 1838, well over 500 tons of oil were lifted from the stations about Cook Strait by those owners of stations who had their own stores in Sydney, and more than 600 tons from the shore stations on Foveaux Strait. This represents at least £50,000 at 1838 prices in London. The production of the whaling industry would be very much greater than this, for these figures take no account of the oil won or lifted by Australian, American, English and French bay whalers who anchored in the bays or patrolled the coastline. But the heyday of whaling on and off the New Zealand coast was rapidly passing: when the first settlers arrived at Port Nicholson the industry was in decline. Within another decade the spoliation of the whales was almost as complete as that of the seals.

INFANT AGRICULTURE AND TRADE

Meanwhile the soil was claiming some attention, and the first pakeha agricultural experiments were being conducted in different scattered parts of the new land. They were to prove of immense value to the immigrants about to arrive in their hundreds. The whalers had long had their gardens in which they cultivated green vegetables enough for their own requirements, and they had at least experimented with grains. Vessels picking up oil and whalebone from the stations in Cook and Foveaux Straits regularly returned to Sydney with from five to twenty tons of potatoes and either pigs or salt pork on board, and although most of these were purchased from the natives, some may well have been produced by the whaling gangs themselves. D'Urville found at Otakou in the southern region a dozen cottages occupied by the whalers surrounded by gardens containing all the vegetables of Europe. At a distance were potato cultivations; and in neighbouring forest clearings were gardens of potatoes, lettuce and turnips. These belonged chiefly to Europeans, but the work was always performed by the Maori women, although at times payment in rum and brandy would induce the Maori men to undertake the tillage and weeding operations. Both Weller and Johnny Jones in the 1830's considered the idea of establishing agricultural settlements of Europeans from Sydney adjacent to their stations in the south; and before the end of the decade, Jones had sent down to Waikouaiti the first regular shipload of agricultural settlers. He established them with twenty head of cattle at Matanaka, but progress was so slow and success so restricted that



In the Far North—Kororareka in 1836 as seen by J. S. Polack.

UTILEMENT—

In the Far South—the Anchorage at Otakau, 1840.



they had at times in the next two years to subsist on potatoes, fish and Maori cabbage.

In the central region of culture contact especially on the mainland opposite Mana and Kapiti the Maori cultivated potatoes and reared pigs which they sold to the ships that put in to the roadsteads there. They exchanged potatoes, pigs, turnips, firewood, mats and tattooed heads for muskets, powder, flints, blankets, shirts, prints, tobacco, pipes, spirits, beads and axes. But after 1833 the natives had competition from the first European commercial agricultural establishment in New Zealand, for in March that year Mr. John Bell settled himself and his belongings on Mana Island taking with him from Port Jackson ten head of cattle, 102 sheep, and two and a half tons of hay. The following year the *Sydney Herald* reported that Mana was 'a very convenient place to refresh at. The anchorage is safe at all times; wood and water are both good and plentiful, and fresh beef, mutton, lamb and pork with rabbits, poultry and vegetables may be procured at Mr. Bell's establishment on reasonable terms'. Later the whaler Hempleman operated a similar though smaller establishment at Peraki and at the close of the decade the Greens, who ran W. B. Rhodes's infant cattle station near Akaroa, had charge of a small farm and herd of cattle and were carrying on regular farming operations which much impressed French scientists, explorers and whalers who put in here for supplies.

MISSIONARY FARMS

In the northern region of contact, those Maori who happened to live within easy reach of the mission stations—and these had been established by 1838 not only in the North Auckland peninsula but also at the Thames and up the valley at Waipa, at Rotorua and on opposite coasts at Kawhia and Tauranga—were also being introduced to pakeha agricultural methods and farming systems, to crops other than potatoes and to livestock other than pigs. In 1814, Marsden's voyage on the brig *Active* had been something like a voyage on the ark, for one entire horse, two mares, one bull, two cows, some sheep and poultry were on board with the missionary party. Soon after their establishment the missionary stations became oases in a desert—oases of constructive activity in contrast to the destructive exploitation of Maori life and indigenous resources that already characterised the north. They were oases in which there was agricultural instruction and

cation in sharp contrast to the wasteful burning outside them of vegetation in order to plant potatoes or flax and to the spoliation of hundreds of acres of majestic forest in order to extract a half dozen of the best massive timber trees. Darwin in 1835 found Waimate the 'one bright spot' in a gloomy and disordered landscape. Others began to dot the southerly landscapes in the next few years. In 1830, after some years of limited success, the missionaries at Waimate had 120 sheep, 100 acres in wheat and a mill that ground 48,000 pounds of flour, some grain grown by the natives around who were slowly learning from the example of their fellow Maori who worked on the missionary farm.

DARWIN'S COMMENT

In 1835, Darwin found 'fine crops of barley and wheat in full ear and fields of potatoes and clover large gardens, with every fruit and vegetable which England produces; and many belonging to a warmer clime asparagus, kidney beans, cucumbers, rhubarb, apples, pears, figs, peaches, apricots, grapes, olives, gooseberries, cranberries, hops, gorse for fences and English oaks Around the farmyard there were stables, a thrashing-barn with its winnowing machine, a blacksmith's forge, and on the ground ploughshares and other tools [and] that happy mixture of pigs and poultry . . . as in every English farmyard'. This attractive experiment, conducted in different parts of the north most thickly occupied by the Maori, promised well to rescue him from the depressing and destructive entanglement into which the culture clash had brought him. But it was not to persist, for interest in the most attractive of all New Zealand's resources—the land—was soon to lead to bitter struggle and actual warfare between pakeha settler and Maori tribesman, as a result of which no positive and permanent alternative to the native's disrupted indigenous economy was to be found for two generations and more. Meanwhile the spoliation of the Maori himself continued and his numbers dwindled further. Within a decade the number of Europeans in New Zealand was fast approaching that of the Maori, and a new age was ushered in.

SUMMARY

From 1792 destructive exploitation had been dominant. Not only the easily available littoral resources decimated, such as seals, whales and timber stands, but the Maori people themselves were

exploited and their culture and economy largely destroyed. The landing in 1840 of settlers—seeking primarily new homes—terminated a period of almost unrestrained *Raubwirtschaft* and marked the beginnings of constructive development at the hands of the immigrant western culture. After the close of the decade new forms were imposed on the landscape at several new and different points of landing and contact. Life and landscape changed with increasing rapidity as the European population grew. Resources and habitat values had again to be reassessed and revaluated in the light of changing human circumstances and as new skills and techniques were brought to these Pacific islands by the still-alien culture. Europeans (of a different sort from the 1000 or so in New Zealand in 1839) soon painted marginal segments of the New Zealand canvas with another distinctive and colourful geography, significantly transforming the impression of the whole and the character of its parts.

THE POPULATION OF AOTEAROA: ITS NUMBER AND DISTRIBUTION*

GORDON LEWTHWAITE

THOUGH THE MAORI people have long been the object of close study, it is still impossible accurately to assess their number or to define precisely their distribution before the advent of the pakeha. The intervening century and a half has blurred our view. Some evidence has perished beyond recovery. Native traditions are of obvious value. Such estimates as were made by early observers were tentative and vitiated by paucity of evidence. Conclusions varied from observer to observer; the same individuals sometimes suggest different figures on different occasions. Detailed widespread historical and archaeological research has not yet been undertaken. Although Buck rightly says 'we shall never know'¹, there is, however, data upon which a profitable conjecture may be based.

The impressions of early observers are significant. Many of these are set out in Table I.

MAORI POPULATION ABOUT 1840

Estimates made after 1830 are in general agreement that numbers reached 150,000 or more in the 'thirties. Craig, Polack, Yate, Wilkes, Wade and Terry support this, and Baring, summing up evidence presented to a Parliamentary Commission, said the best estimates did not exceed 150,000.² But Polack also said there were not more than 100,000,³ and others who based their figures on local assessments and were therefore less likely to err, supported a lower estimate. Williams thus concluded that there were 106,000 in the North Island.⁴ Others suggested 105,000. Hamlin's estimate of 120,000⁵ was based on a more detailed count than that of Williams. Colenso stated there were 40,000 warriors in the North Island in the late 'thirties,⁶ which

This article is an extension of an appendix to a thesis presented for the Degree of Master of Arts at the University of New Zealand. The body of the thesis is an essay on the historical geography of New Zealand in the latter part of the eighteenth century and was prepared during 1949 under the direction of the staff of the Department of Geography, Auckland University College.

H. Buck: 'The Passing of the Maori', *Trans. and Proc. N.Z. Institute*, Vol. 55, 1924, p. 364. [British] *Parliamentary Papers Relative to New Zealand*, London, 1838, p. 85.

... p. 180.

... p. 129, and see Table II.

Table II, and 'Estimate of the Maori Population of the North Island circa 1840', *Journ. of the Anthropological Soc.*, Vol. 24, 1915, pp. 72-74.

Colenso: 'The Maori Races of New Zealand', *Trans. and Proc. N.Z. Institute*, Vol. I, 1868, p. 15.

suggests a total of 120,000 if Hamlin's practice of multiplying warrior numbers by three be followed. The South Island contained, at the most, a few thousand. Dieffenbach's detailed analysis,⁷ resulting in the conclusion that there were 114,890 natives in 1843, confirmed these earlier estimates. It thus appears that there were approximately 120,000 Maori people in New Zealand when the Treaty of Waitangi was signed more than seventy years after Cook first examined the coasts of Aotearoa.

EARLIEST ESTIMATES

The early estimates of Cook and his companion Forster (100,000) suggest that numbers had remained stable in the intervening years of European contact, but there are many considerations which indicate that this earliest figure of Maori population was much too low. It was based on the explicit belief

that, in general, no part of the country but the sea-coast is inhabited, and even there . . . the people [are] but thinly scattered, all the western coast from Cape Maria van Diemen to Mount Egmont being totally desolate; so that upon the whole the number of people bears no proportion to the extent of the country.⁸

Cook thus knew nothing of the dense population of parts of the interior and the west coast and wrote 'The Desert Coast' across the map where North Auckland fronts the Tasman, for Hokianga, Kaipara and Manukau lay concealed behind their dunes. Nor did he penetrate many eastern inlets such as the Waitemata and Whangaroa. It seems certain that *at least* half the population lived in districts unknown to him.

EVIDENCE OF LARGE POPULATION

The monuments of ancient Maori settlement that stud our landscapes lend further force to this conclusion. Maning early cited the huge forts and numerous storage pits and drains of the north as evidence of a teeming but vanished population.⁹ The great pa would have required great forces to build and hold them—'at least ten times the number of men the whole surrounding districts, for two or three days' journey, can produce'.¹⁰ Their many terraces had been packed with houses. And such pa were numerous. From one ridge Maning counted twenty others within a radius of fifteen to twenty miles and, significantly, native tradition maintained that each had been the stronghold

⁷E. Dieffenbach: *Travels in New Zealand*, 2 vols., London, 1843, Vol. 2, p. 83.

⁸J. Hawkesworth: *An Account of the Voyages . . . for making Discoveries in the Southern Hemisphere*, London, 1785, Vol. 3, p. 40.

⁹F. E. Maning: *Old New Zealand*, Auckland, n.d. [1948], pp. 180, 181.

¹⁰*Ibid.*, p. 180.

a separate *hapu*. Around them were the storage pits that riddled hilltops 'all over the northern part of the North Island . . . most numerous on open uncultivated tracts where . . . a rat . . . would hardly find subsistence,'¹¹ bearing witness to cultivation on very

TABLE I
EARLY ESTIMATES OF MAORI POPULATION

SOURCE OF INFORMATION	DATE	ESTIMATE
Cook.....	1768-74	100,000**
Forster.....	1774	100,000
Nicholas.....	1817	150,000
Urville.....	1830	250,000
Maig.....	1830	200,000 (In North Island)
Williams.....	1834	> 160,000
.....	1834	200,000
.....	1835	106,000 (In North Island)
.....	1835	180,000
.....	1835	150,000
.....	1830's	120,000-160,000 (In North Island)
.....	1832	500,000
.....	1838	105,000 (In North Island)
.....	1830's	200,000-300,000
.....	1838	150,000
.....	1838	130,000
.....	1838	> 50,000
.....	1838	500,000 (Many others say > 1,000,000)
.....	1838	158,300
.....	1838	100,000 (In North Island)
.....	1838	100,000 (In North Island)
.....	1838	150,000
.....	1839	46,000-50,000
.....	1840	100,000
.....	1840	> 80,000
.....	1842	150,000
.....	1842	150,000 (In North Island)
.....	1842	120,000 (In North Island)
.....	1843	114,890
.....	1845	140,000-180,000
.....	1847	3-4,000 (In South Island)
.....	1847	120,000 (Missionary estimate)
.....	1847	150,000 (Others)
.....	1849	120,000
.....	1852	80,000
.....	1853	60,000

estimates marked by an asterisk are considered the most important and reliable.
statement by A. K. Newman in 'A Study of the Causes leading to the Extinction of the
Maori', *Trans. and Proc. N.Z. Institute*, Vol. 14, 1881, p. 460 and by A. E. Mulgan in *The City of
the Future*, Wellington, 1939, p. 4, that Cook gave an estimate of 400,000 seems to lack foundation.

prior ground, and suggesting that population had pressed on means subsistence.

Other early observers endorsed this testimony. Polack, for instance, approvingly quoted the two Williams who noted the ruins of settle-ment at Mangawai (Thames) where 'the people had been swept away

as with the besom of destruction', while between Katikati and Tauranga the country, 'from the number of deserted pas, was formerly thickly inhabited.'¹² Recent writers emphasise this evidence. The hillsides of the north are graven with intricate tattoo. There was *Oruru-pa-karangatahi*—'Oruru with the forts aroused by one call'¹³—where 'a ridge was scarped and terraced for a distance of several miles,'¹⁴ and there were many pa between Kawakawa and Hokianga. Great areas near Taiaimai were cleared for cultivation. Parts, at least, of the Kaipara shores bear the impress of dense settlement.¹⁵ The lower Hauraki Gulf

must have supported an enormous aboriginal population. Every hill-top, every point of vantage, is carved and terraced into forts and watch-towers, not only along the coast, but for miles inland. Not only this, but every foot of valley land was dug and drained, and the stones carefully removed and piled in heaps.¹⁶

There were more than a score of big pa on the Auckland isthmus, and One Tree Hill alone must have held four or five thousand people.¹⁷

VILLAGES VERY NUMEROUS

Some parts of the eastern and western coasts are strewn with relics. The littoral between Kawhia and Wanganui bears signs of a dense population, and Percy Smith named a hundred Taranaki pa. Blake Palmer found that 'certain areas like that between the Urenui and Mini rivers are so thickly studded with pa as to prove almost confusing to a ground observer.'¹⁸

The east coast had many pa also, especially near Whakatane, and Lambert wrote that

all over the [Wairoa, Hawkes Bay] district are many traces, not only on the hilltops but in the valleys, which show that there was certainly a dense population on the seaboard [One] could find from 50 to 70 pas within a radius of less than 10 miles.¹⁹

Guthrie-Smith quoted native traditions of a time

when the Ngai-Tatara—when the Maori people everywhere—had attained its maximum numbers; when on Tutira as elsewhere every height and fastness was utilised for defence, when every fertile locality was devoted to cultivation.²⁰

¹²J. Polack: *New Zealand*, London, 1838, Vol. 2, p. 343.

¹³Buck: *loc. cit.*, p. 363.

¹⁴E. Best: *The Pa Maori*, Wellington, 1929, p. 2.

¹⁵E. Harding: 'Prehistoric Drains on the Kaipara', *Journ. Polynesian Soc.*, Vol. 37, 1928, pp. 367-369. and S. Percy Smith: 'Wars of the Northern against the Southern New Zealand Tribes', *Journ. Polynesian Soc.*, Vol. 10, 1901, p. 39.

¹⁶Quoted by Best: *op. cit.*, p. 39.

¹⁷E. Best: 'Maori Agriculture', *Journ. Polynesian Soc.*, Vol. 39, 1930, p. 349.

¹⁸G. Blake Palmer: 'New Zealand Archaeology and Air Photography', *Journ. Polynesian Soc.*, Vol. 56, 1947, p. 237.

¹⁹T. Lambert: *The Story of Old Wairoa*, Dunedin, 1925, p. 197.

²⁰H. Guthrie-Smith: *Tutira*, London, 1921, p. 56.

Walsh was equally emphatic, commenting on the amazing number of pa throughout the length and breadth of the land, and adding that practically

all the open fertile country of the North Island shows unmistakable signs of agricultural operations. The clay hills of the north are covered with surface drains, the volcanic hills of Taranaki are perforated with storage pits, all over the Waikato delta the pumice land has been excavated for sand to spread over the kumara cultivations: every narrow river valley, every little shingle patch along the coast, and every sheltered nook under the sea-cliffs has been utilised; even the rocky scoria flats The traces of occupation are so extensive that it is safe to estimate the population before the decay commenced not at one but at many hundreds of thousands.²¹

EXPANDING TESTIMONY TO DENSITY OF POPULATION

This evidence is constantly being added to as farms are carved from bush and swamp, revealing signs of habitation in inland regions about which tradition is silent, while air photography reveals signs of unsuspected extent. Cumberland suggests many indications may have been disguised and lost under aggressive vegetation.²² Buck, after surveying the desolate ruins, says that

north and south, east and west the same sad comparisons hold. There are stretches of coast with many magnificent pa, girt with fosses and rising tier on tier of terraces What proportion then shall we say existed in the numbers of the men of the past to the men of the present? [The census of 1921 reported the Maori population as about 50,000.] Were they four times as many? They were at least that. Were they ten times as many? It does not seem improbable.²³

DEPOPULATION: 1750-1850

A further line of evidence suggests that population had once been much greater. Cook's statement that 'these people enjoy perfect and uninterrupted health'²⁴ was a slight exaggeration, for leprosy was endemic, but the Maori dwelt in sanitary villages on breezy hillsides, lived a spartan life, and enjoyed a well-balanced and uncomplicated diet. But diseases early began to take their toll. Though Dieffenbach's account²⁵ of an epidemic before 1769 may be antedated, there is some evidence that a European ship visited Cook Strait shortly before

²¹Archdeacon Walsh: 'The Passing of the Maori', *Trans. and Proc. N.Z. Institute*, Vol. 40, 1907, p. 155.

²²K. B. Cumberland: 'Aotearoa Maori: New Zealand about 1780', *Geogr. Rev.*, Vol. 39, 1949, p. 417.

²³Buck: *loc. cit.*, p. 364.

²⁴Hawkesworth: *op. cit.*, p. 56.

²⁵Dieffenbach: *op. cit.*, Vol. 2, p. 13.

Cook's first visit and left behind the venereal curse.²⁶ It seems certain that

several serious devastating epidemics swept these isles since the days of Cook. No district seems to have escaped these visitations.²⁷

Rewharewha swept through Aotearoa at the time of Cook's second visit,²⁸ or about 1790,²⁹ perhaps depopulating Taiaimai³⁰ and helping to empty the pa of Tamaki.³¹ When it reached the Urewera, 'Tuhoe flowed like water down to Hades',³² and a Wanganui native said it 'slaughtered until thousands were represented by hundreds and hundreds by tens Men did not die singly, but in tens, and twenties, and thirties. Day by day and day by day they died.'³³ Colenso said it destroyed nearly three-fifths of the people in the south of the North Island,³⁴ and it apparently affected South Islanders also.³⁵ Perhaps this was dysentery, epidemics of which seem to have occurred in 1795 and 1805,³⁶ or possibly influenza.³⁷

Another disease, *Te Ariki*, destroyed great numbers in 1810 or 1820.³⁸ In 1826 further epidemics followed the visit of the ship *Coromandel*.³⁹ Venereal disease—which seems to have affected fertility more than the health of the individual—became widespread as shipping became more frequent. Watkins in 1838 maintained that at the Bay of

²⁶Cook was convinced that someone had preceded him. See especially D. MacDonald Wilson: 'New Zealand History—Notes of Medical Interest', *N.Z. Medical Journal*, Vol. 33, 1934, pp. 205–208.

²⁷E. Best: *The Maori*, Wellington, 1924, Vol. 2, p. 37.

²⁸W. H. Goldie: 'Maori Medical Lore', *Trans. and Proc. N.Z. Institute*, Vol. 37, 1904, pp. 84, 85.

²⁹T. W. Downes: *Old Whanganui*, Hawera, 1915, p. 89; S. Percy Smith: 'History and Traditions of the Taranaki Tribes', *Journ. Polynesian Soc.*, Vol. 18, 1909, p. 1; and *idem*: 'Wars of the Northern against the Southern Tribes', *Journ. Polynesian Soc.*, Vol. 13, 1904, pp. 20–72.

³⁰W. H. Skinner: 'Ancient Maori Canals', *Journ. Polynesian Soc.*, Vol. 21, 1912, p. 106.

³¹G. Graham in J. Barr: *The City of Auckland, 1840–1920*, Auckland, 1922, p. 25.

³²Best: *The Maori*, Vol. 2, p. 37.

³³Goldie: *loc. cit.*, p. 86.

³⁴Colenso: *loc. cit.*, p. 344.

³⁵H. Beattie: *Tikao Talks*, Dunedin, 1939, p. 150.

³⁶Goldie: *loc. cit.*, p. 85.

³⁷*Rewharewha* was probably the name for different diseases, and the accounts here cited may refer to different diseases or different epidemics of the same disease. (There are great differences in dates suggested.)

W. H. Goldie in *Polynesian Medical Researches*, an unpublished manuscript in the Auckland Public Library, says (p. 145) 'several severe epidemics [of dysentery] are recorded. Towards the close of the [eighteenth] century a European ship called at Mercury Bay and soon afterwards a severe epidemic of a disease called by the Maoris *makoko*, or *maripa*, broke out and proved fatal to many persons. It had a dysenteric character and caused death after a few days' illness. About five years after this, another pestilence broke out, called *rewarewa*, and so many died that the living could not bury the dead. It commenced among the natives in the north, and also was dysenteric in character. As a general rule diarrhoea and dysentery, especially the former, were common in the native villages and death frequently resulted from exhaustion due to lack of proper food and treatment'.

³⁸Percy Smith: 'History and Traditions . . .', *loc. cit.*, p. 41; and *idem*: 'Wars of the Northern against the Southern Tribes', *Journ. Polynesian Soc.*, Vol. 8, 1899, pp. 202, 203.

³⁹MacDonald Wilson: *loc. cit.*, p. 209.

Islands not one woman in fifty was free from the disease,⁴⁰ for 'ship-girls' were sent aboard to live with the men, contract venereal disease and perhaps tuberculosis, and spread infection. Scrofula led to pulmonary diseases,⁴¹ and 'by 1834 tuberculosis and other diseases were very prevalent',⁴² proving the scourge of young women in particular. A medical doctor asserts that 'a new generation was born predisposed to the disease.'⁴³

ANCIENT ECONOMY AND HABITS DESTROYED

Native susceptibility to infection was increased by changes of habit and habitat. Musket-fire and flax-gathering induced villagers to move down to river flats

where the water even in summer sprung with the pressure of the foot, and where in winter the houses were often completely flooded. There, lying on the spongy soil, on beds of rushes which rotted under them—in little low dens of houses, or kennels, heated like ovens at night and dripping with damp in the day—full of noxious exhalations from the damp soil, and impossible to ventilate—they were cut off by disease in a manner truly frightful.⁴⁴

Such a change, said Maning, was universal. Flax clothing, readily hung aside when wet, was partly replaced by blankets and pakeha clothes which harboured infection and were worn till they rotted off. Muskets, without which the community was vulnerable to deadly attack, could sometimes be procured only at a price of exposure, 'continual excitement, overwork, and insufficient food.'⁴⁵ Some paradoxically assert that sloth and overeating sapped stamina and virility,⁴⁶ for conditions varied with time and place. It seems that the more easily procured diet of potatoes and maize, with its excessive starch, was unwholesome.⁴⁷ The use of putrid corn may have affected health.⁴⁸ Though *waipiro* (stinking water) was at first despised, in the late 'thirties missionaries were insistent that adulterated and vile liquors accelerated decline.

WAR TAKES ITS TOLL

More spectacular was the mounting destructiveness of warfare. There was little strife with Europeans before 1840, though these were

⁴⁰[British] *Parliamentary Papers*, *op. cit.*, p. 23.

⁴¹*Ibid.*, p. 121.

⁴²MacDonald Wilson: *loc. cit.*, p. 121.

⁴³*Ibid.*, p. 214.

⁴⁴Maning: *op. cit.*, p. 186.

⁴⁵*Ibid.*, p. 189.

⁴⁶Newman: *loc. cit.*, p. 477 (See footnote to Table I).

⁴⁷G. Home: 'The Health of the Ancient Maori', *N.Z. Medical Journal*, Vol. 32, 1933, p. 254.

⁴⁸F. D. Fenton: *Observations on the State of the Aboriginal Inhabitants of New Zealand*, Auckland, 1859, pp. 33, 34 and 40.

fully armed and sometimes brutal. But natives had long resented insults and maintained their interests with *mere* and *taiaha*. Bitter vendetta accumulated through the generations

until towards the end of the eighteenth century tribal warfare had reached a summit of savagery unparalleled anywhere in the Pacific The introduction [of the musket] took place at that stage in the history of the Maori people, when all over the North Island tribe warred with tribe, and bloody struggles were taking place which, if civilisation—though attended by much evil—had not entered might have ended in the depopulation of the country.⁴⁹

From North Cape to the Auckland Islands, Nga Puhī and Waikato, Arawa and Ngāti Toa, with many other tribes, grappled and massacred. Musket-armed warriors terrorised opponents armed with ancient weapons. 'They revelled in destruction, slaying thousands . . . [and] remorselessly destroyed wherever they went From 1822 to 1827 was truly a fearful period in New Zealand. Blood flowed like water'.⁵⁰

Cannibalism was an additional incentive to slaughter and there was often an aftermath of massacre, disease and infanticide, for fleeing women often destroyed their children, and feasting victors sometimes lingered on the battlefield till smitten by disease. The early nineteenth century was, said Travers, 'a period of slaughter almost unparalleled in any country when compared with the total population engaged in the conflicts'.⁵¹

EXTENT OF DEPOPULATION

There is, of course, no means of accurately assessing the numbers which perished in such warfare. Colenso had 'no doubt that the numbers killed . . . during this period of forty years . . . including those who perished in consequence [of the wars] far exceeded 60,000'.⁵² Best thought 20,000 were destroyed with the new weapons between 1820 and 1840,⁵³ and, together with Percy Smith,⁵⁴ accepted as authoritative the missionary estimate that 80,000 were killed or died through causes incidental to the wars between 1800 and 1840. Miller says 'scores of thousands',⁵⁵ and Shrimpton 'quite a quarter of the population'⁵⁶ were slain. Someone claimed that forces led by Te

⁴⁹Sir Apirana Ngata, quoted in L. J. B. Chapple and H. C. Veitch: *Wanganui*, Hawera, 1939, p. 8.

⁵⁰Colenso: *loc. cit.*, pp. 414, 415.

⁵¹W. T. L. Travers: 'Life and Times of Te Rauparaha', *Trans. and Proc. N.Z. Institute*, Vol. 5, 1872, p. 46.

⁵²Colenso: *loc. cit.*, p. 414.

⁵³E. Best: 'Te Whanga-nui-a-Tara', *Journ. Polynesian Soc.*, Vol. 10, 1901, p. 151.

⁵⁴Best: *The Maori*, Vol. 2, p. 285; and Percy Smith: 'Wars . . .', *loc. cit.*, pp. 61, 146.

⁵⁵H. Miller: 'Maori and Pakeha, 1814-1865' in I. L. G. Sutherland: *The Maori People Today*, Auckland, 1940, p. 76.

⁵⁶A. W. Shrimpton and A. E. Mulgan: *Maori and Pakeha*, Christchurch, n.d. [1921], p. 39.

Rauparaha were 'directly responsible for the death of 50,000.⁵⁷ Walsh considered that

at least one fourth of the total number perished in [Nga Puhi] wars, and probably another fourth were swept away in the raids of Waharoa, Te Whero Whero, and Rauparaha When we consider that the warriors engaged were the very flower of the Maori people, we can understand that the loss to the race was quite beyond numerical computation.⁵⁸

Nor were these the only agents of depopulation. Psychological factors operated even before 1840. Wohlers thought the increasing power of *tapu* was harmful,⁵⁹ but the effect of breaches of *tapu* may have been more potent. Polack wrote of continual suicides by natives 'wearied of a life without spiritual hope',⁶⁰ and Fitzroy reported that the northern peoples 'contrasted the rapid growth of the pakeha families with their own. Their common expression was "The Land is not for us, the Land is for the White Men".'⁶¹ Increased infanticide accompanied temporary liaisons with pakeha, and nostalgia and melancholy exerted a baneful influence.

AUTHORITATIVE OPINION ALMOST UNANIMOUS

Contemporary testimony reinforces other evidence. Fitzroy quoted native opinion in support of rapid decline, and Maning said the Maori were unanimous in affirming they were much more numerous in former times.⁶² Pakeha opinion endorsed this. Laplace deplored the 'frightful results' of white intrusion.

Les parties autrefois les plus florissantes d'Ika-na-Mauri sont transformées aujourd'hui en solitudes; . . . les beaux villages qui couvraient les bords de la baie Shouraki et de la rivière Tamise aussi que la plupart des autres points de la côte orientale ont presque totalement disparu.⁶³

Polack was sure that large-scale depopulation had occurred.⁶⁴ Yate, referring to the Bay of Islands, said population was 'evidently on the decline',⁶⁵ whilst Marshall wrote of 'the almost depopulated shores of New Zealand.'⁶⁶ Busby wrote that

the depopulation of the country has been going on, till district after district has

⁵⁷Quoted in J. D. Peart: *Old Tasman Bay*, Nelson, 1937, p. 27.

⁵⁸Walsh: *loc. cit.*, p. 158.

⁵⁹J. F. H. Wohlers: 'Conversion and Civilisation of the Southern Maori', *Trans. and Proc. N.Z. Institute*, Vol. 14, 1881, p. 123.

⁶⁰Polack: *op. cit.*, pp. 334, 335.

⁶¹Report of the Parliamentary Select Committee on Aborigines, p. 336.

⁶²Maning: *op. cit.*, p. 180.

⁶³C. P. Laplace: *Voyage autour du Monde*, Paris, 1833, Vol. 4, p. 22.

⁶⁴Polack: *op. cit.*, p. 343.

⁶⁵Report Parl. Select Comm., p. 242.

⁶⁶W. B. Marshall: *Two Visits to New Zealand*, London, 1836, p. 305.

become void of its inhabitants and the population is even now but a remnant of what it was in the memory of some European residents.⁶⁷

Flatt thought the Maori were in danger of extermination.⁶⁸ 'Missionary opinion is that population is wasting away.'⁶⁹ Baring, considering this and other evidence, concluded that 'the natives are decreasing: a letter from a Mr. Stack still more confirms this.'⁷⁰

There is much evidence indicating a considerable—indeed a spectacular—decline. Cook mistakenly thought the east coast alone was well inhabited; warfare, change of village site, unhealthy habits, disease—known to have decimated other Pacific islanders—and depression were the potent agents of decay. Contemporary testimony and the ruins which strew our landscapes yield further evidence. Yet there are dissidents. H. D. Skinner, for instance, even considers Cook's estimate of 100,000 to be too high.⁷¹ Caution is justified.

—BUT CAUTION NECESSARY

The relics of occupancy may mislead. Aotearoa had been inhabited long before the 'Fleet' arrived (1350 A.D.). Toi settled about 1150, and there were people before him—perhaps even before Kupe (950). Some authorities accept the persistent claim that Maui 'fished up' the land, and according to the legend he found it populated.⁷² 'New Zealand', writes Buck, 'has been occupied far longer than seven and a half centuries.'⁷³ Thus many hints would be left in soil and hilltop.

The character of settlement increased such traces. Shifting agriculture multiplied the scattered cultivation. There were often villages for defence, residence, fishing, fowling and cultivation, and only one might be occupied at one time. Pa were often abandoned for reasons which the pakeha would consider trivial, for instance, the decease of a chieftain or one of his family.

The party who once lived there did not cease to consider [the spot] their own . . . and no other persons, although of the same tribe, would think of selecting that place for a residence without invitation or consent. When a pa was taken by an enemy . . . it was very seldom reoccupied. The victorious party . . . were anxious to make good their retreat . . . the vanquished would prefer to divide themselves among their neighbours, or to build a new pa elsewhere; indeed, the soil stained by the blood of their relations was tapu.⁷⁴

⁶⁷[British] *Parliamentary Papers*, . . . , p. 340.

⁶⁸*Ibid.*, p. 45.

⁶⁹*Ibid.*, p. 181 (Quotation by Coates).

⁷⁰*Ibid.*, p. 149.

⁷¹H. D. Skinner: 'The Maoris' in the *Cambridge History of the British Empire*, Vol. 7, p. 19. (Skinner, in a personal communication, states that he attributed too much weight to Cook's opinion.)

⁷²See J. C. Andersen: *Maori Place-Names*, Wellington, 1942, pp. 91-100.

⁷³P. H. Buck: *The Coming of the Maori*, (Cawthron Lecture), Nelson, 1925, p. 33.

⁷⁴E. Shortland: *The Southern Districts of New Zealand*, London, 1851: pp. 48, 49. A *tohunga* could, and sometimes did, remove such an interdict.

When a feud severed neighbouring tribes, wide borderlands might be temporarily or permanently vacated, and whole districts were sometimes emptied when a tribe migrated, successively building and abandoning series of pa. Thus it would be naive to correlate the far-flung traces of settlement with population numbers at any one time.

Some descriptions of the extent of settlement seem exaggerated. Best dismisses Walsh's statement that practically all the open fertile country of the North Island had been tilled as 'rather far-fetched. . . . Much open fertile country has *not* been cultivated . . . though patches of it may have been'.⁷⁵ And Guthrie-Smith's statement that every height and fertile locality had once been fully occupied seems to be error or hyperbole. It is possible—quite certain, some think—that only a small fraction of the numerous pa were ever occupied simultaneously.

EARLY OBSERVERS DIFFER

Nor can the opinions of early observers be accepted uncritically. As Shortland pointed out,⁷⁶ even Cook seems to have overestimated the population of Hawaii by one quarter at least, and never seemed impressed with the population of even the most populous districts observed.⁷⁷ Willingness to find fault with the pakeha may have been reflected in exaggerated native accounts of depopulation. Picturesque expressions were habitually used. The Waitaha, for instance, 'covered the ground like ants'; and some have been 'more impressed by the picturesque imagery of their informants than by the need for historical truth'.⁷⁸ Some statements by pakeha were equally unreliable.

Some early observers, while not questioning the extent of decline in population, did question particular alleged causes of decline. Montefiore was doubtful whether venereal disease caused depopulation⁷⁹ and Tawell could recollect only five or six cases.⁸⁰ Pulmonary diseases were certainly common, yet not more common than in England, Shortland added.⁸¹ Fenton, a later observer, questioned the effect of epidemics.⁸² Moreover the virile Maori population might quickly recover its former level.

⁷⁵E. Best: 'Maori Agriculture', *Dominion Museum Bulletin* No. 9, 1929, p. 67.

⁷⁶Shortland: *op. cit.*, p. 46. F. M. Keesing in *The South Seas in the Modern World*, New York, 1941, p. 49 seems to suggest that there may not have been many more than 200,000.

⁷⁷Colenso's statement that Cook never saw the most densely populated regions (*loc. cit.*, p. 415) appears misleading, as does Travers's account in the *Life and Times of Te Rauparaha*.

⁷⁸A. H. McLintock: *History of Otago*, Dunedin, 1949, p. 29.

⁷⁹*Report Parl. Select Comm.* . . . , p. 66.

⁸⁰*Ibid.*, p. 121.

⁸¹Shortland: *op. cit.*, p. 65.

⁸²Fenton: *op. cit.*, p. 34.

Although the Maori population largely succumbed, the influence of Europeans was not wholly harmful. Change of foods may not have been as deleterious as some suggest. The use of the potato accompanied, and probably was causally related to, local increases of population in the South Island. Skinner even suggests that this was universally true.⁸³ Liquor and putrid corn were used only after 1830.⁸⁴ Wohlers paid generous tribute to the influence of the whalers in the south, and while admitting the extent of depopulation, he criticised the opinion that the whalers were in any way responsible for it. He asserted that the whalers inculcated higher ideals and had healthy and happy families.⁸⁵ Polack, who at first claimed infanticide was the principal cause of depopulation, admitted when pressed that it had decreased since Europeans arrived.⁸⁶ Montefiore doubted whether 'whole districts had been depopulated'⁸⁷ while Watkins even had doubts whether the natives were decreasing,⁸⁸ and Shortland also disbelieved the fact.⁸⁹

As for native wars, they had, as some pointed out, always been bloody yet did not appear to have caused decline of population. The musket exacerbated strife, but many captives were spared to become slaves or wives, while the survivors frequently rebuilt their numbers by the deliberate policy of *whakatupu tangata*.

SOUTH ISLAND POPULATION FIGURES

Some suspicion that the pre-pakeha population may occasionally have been overestimated is strengthened by two detailed but localised studies.⁹⁰ D'Urville thought 50,000 inhabited the South Island, and traces of occupation are fairly widespread. Early writers speak of thousands in Otago. Stack believed Banks Peninsula accommodated thousands,⁹¹ and Hay that it had a bigger Maori population about 1840 than all the South Island at present.⁹² Epidemics, internal feuds and Rauparaha's onslaughts grievously afflicted the southern people. Yet Rutherford maintains that at no time did the inhabitants of the island exceed 3,000 in number. This conclusion is open to challenge.

⁸³H. D. Skinner: *loc. cit.*, p. 19; and E. Durward: 'The Maori Population of Otago', *Journ. Polynesian Soc.*, Vol. 22, 1933, p. 81.

⁸⁴Fenton: *op. cit.*, p. 40.

⁸⁵Wohlers: *loc. cit.*, p. 134.

⁸⁶Report Parl. Select Comm. . . . , p. 85.

⁸⁷*Ibid.*, p. 183.

⁸⁸*Ibid.*, p. 23.

⁸⁹Shortland: *op. cit.*, p. 75.

⁹⁰Durward: *loc. cit.*, and D. Rutherford: *The South Island Maori Population*, unpublished typescript, Otago Museum.

⁹¹J. W. Stack in H. C. Jacobson: *Tales of Banks Peninsula*, Akaroa, 1898.

⁹²J. Hay: *Earliest Canterbury*, Christchurch, 1911, p. 49.

Certain considerations may be interpreted to qualify evidence which at the first glance indicates an earlier Maori population greatly outnumbering that of 1840. Aotearoa had long been occupied, various causes multiplied the traces of settlement, some evidence is of dubious value, while the assertions of some early observers are sometimes contradictory. Their testimony is merely qualified, not cancelled. There is a preponderant weight of evidence pointing to the conclusion that population had been much greater than it was in the first half of the nineteenth century.

ONLY ONE CONCLUSION POSSIBLE

Pa were of such dimensions that numbers well in excess of those found by early travellers must have built and defended them. Maning claims that ten times the local Maori population of his time would have been required to man one pa.⁹³ Henry Williams found 1,400 dwelling on the eastern slope alone of Pouerua pa (inland of the Bay of Islands). When fully occupied it must have held 'a very much greater number'.⁹⁴ On the Auckland isthmus Maungakiekie (One Tree Hill) is thought to have held four to five thousand and Mount Eden quite 3,000.⁹⁵ Thus single pa demanded considerable populations, and, as Buck points out,⁹⁶ in some districts, at least several such pa were occupied simultaneously. Maning was told each was the stronghold of a separate *hapu*. The records of Auckland isthmus show a number were inhabited at the same time. Buck, after indicating the vast number of sites throughout the land, said

though many of these may have been temporary abiding places for fishing and hunting purposes, and others have not been continuously occupied, after making liberal allowances, the signs of occupation point to the existence of a large population.⁹⁷

Contemporary witnesses overwhelmingly asserted that population was drastically reduced before 1840. Though some testimony was ill-informed or tendentious, and a minority dissented, it is improbable that many independent observers were victims of an illusion. Criticism of the majority opinion was often based on faulty premises. Coates, for instance compared Cook's estimate with that of Williams, and deduced that there could have been little depopulation. Yet it seems clear that Cook seriously underestimated numbers, and Coates admitted that

⁹³Maning: *op. cit.*, p. 180.

⁹⁴Best: *The Pa Maori*, p. 222.

⁹⁵S. Percy Smith: 'The Peopling of the North', *Journ. Polynesian Soc.*, Vol. 6, 1897, (Supplement), p. 77.

⁹⁶Buck: 'The Passing of the Maori', *loc. cit.*, p. 364.

⁹⁷*Ibid.*

missionaries in New Zealand were positive that depopulation was rapid.⁹⁸ Shortland sought to explain observed decrease by local migration but of course lacked knowledge of the future which showed death, not migration, to be the principal cause. Probably the pessimists were also right in asserting that children were few and the sex ratio inclined to masculinity.⁹⁹ There is abundant evidence that warfare was conducted in the nineteenth century with new deadliness and ferocity over the whole land, and that epidemic diseases and change of habitat and habit were potent agents of decay.

The opinions of modern authorities support the conclusion that the number of the Maori people had been considerably greater than it was in 1840. The New Zealand Official Year Book asserts that there was 'a decline . . . following the advent of the Europeans, but this . . . was commonly exaggerated by early writers.'¹⁰⁰ Best considers that ruins in the north 'show that the country must once have supported a large population. But our information is not precise enough to enable us to speak with any certainty.'¹⁰¹ Duff suggests population was about 165,000.¹⁰² Fisher thinks it was between 200,000 and 300,000.¹⁰³ Buck asserts it numbered at least 200,000 and not improbably 500,000, though he seems to prefer 400,000.¹⁰⁴ Cumberland claims that Aotearoa had the resources to support 1,000,000 at the Maori's neolithic culture level and suggests that 'the island might well, at times, have sustained a population considerably larger than half this number during the eighteenth century.'¹⁰⁵

A QUARTER OF A MILLION

Buck thinks 200,000 the lowest possible estimate, and the other opinions cited scarcely clash with this. It seems supported by the historical evidence in general. A population of over 200,000 is also indicated if it be accepted that Cook's estimate of 100,000 was valid *for those districts which he observed*, and if it be agreed that these contained not more than half the total. That such was the case is suggested by general evidence and is strongly supported by statements on distribution made by the most reliable early observers. Williams, Hamlin and Dicffenbach respectively credited the districts observed by Cook

⁹⁸Report Parl. Select Comm. . . . , p. 182.

⁹⁹Shortland: *op. cit.*, pp. 53, 54.

¹⁰⁰N.Z. Official Year Book 1946, Wellington, p. 35.

¹⁰¹Best: *The Maori*, Vol. 2, pp. 313, 314.

¹⁰²Personal communication.

¹⁰³Personal communication.

¹⁰⁴Buck: 'The Passing of the Maori', *loc. cit.*, p. 364.

¹⁰⁵Cumberland: *loc. cit.*, p. 417.

with approximately more than forty, fifty and forty-seven percent of the total population. These estimates also agreed that these same districts held rather more than 50,000 just before or about the time of the annexation. It would appear that this population had almost halved since Cook's visit. If the districts Cook observed held distinctly less than half the numbers, the total must have been more than 200,000: if half had perished by 1840, 120,000 was half the ancient total, that is 240,000. These calculations may be very misleading, for the accuracy of Cook's estimate cannot be tested, nor the precise extent of the inhabited areas upon which it was based. Nor do we know whether the populations of other districts had decreased in the same proportion. But these results coincide with an impression gleaned from general evidence that, at the time of Cook's visit, about a quarter of a million Maori dwelt in Aotearoa.

THEIR PATTERN OF DISTRIBUTION

Alien interference subsequently induced a decline of population. It also distorted the distribution pattern. Though this cannot be defined with precision, the basic pattern is apparent. Cumberland, using data culled from Dieffenbach and the various accounts of the changes induced early in the nineteenth century, has constructed a map showing the distribution of Maori population in 1780.¹⁰⁶ The main features of the pattern are not in doubt, for the densest concentrations were in the northern peninsula and Auckland isthmus, the Waikato basin and Rotorua, and portions of the east and west coasts of the North Island. But the details of population distribution at the time are less obvious. The map is an admirable suggestion. It was advanced as a first attempt to represent the details of distribution in cartographic form and was intended to be refined by more detailed research. Some minor amendments are suggested here.

The map indicates that the northern peninsula carried a denser population than any region of comparable size in Aotearoa. Many villages clustered around the harbours of both coasts and dotted the inland districts of Taiamai, Oruru and Kaitaia. It seems possible however that population was relatively more dense than is indicated by the present map near North Cape, at Whangarei, and in southern Kaipara, and less dense around northern Kaipara. The density suggested for the isthmus is anachronistic, for although Tamaki was well-peopled

¹⁰⁶*Ibid.*, p. 419. The map as originally published is unfortunately misdated. 1780 should obviously be read for 1880. It is reproduced elsewhere in this issue of the *New Zealand Geographer*. See p. 18.

almost until the close of the century, numbers had declined sharply from the maximum which was attained before 1750.

The western coast was well-peopled. Many lived near the Raglan and Kawhia Harbours, and though there is no record of the population of Taranaki before war and migration almost emptied the area, traces of population are very numerous, particularly in the north but also around the coast to the Waitotara. The impressions of writers such as Best, Buck, Percy Smith, Walsh and W. H. Skinner¹⁰⁷ suggest that a narrow coastal strip was as closely occupied as the northern centres, but H. D. Skinner would be very much surprised if numbers reached 14,000.¹⁰⁸ The map credits the west coast of Wellington with a dense population and certainly considerable numbers dwelt near Lake Horowhenua and on the borders of the Porirua and Wellington Harbours. But it was after the time to which the map refers that Rauparaha's Ngati Toa and other tribes occupied the districts, destroying and subjugating the earlier possessors, perhaps increasing local numbers at the expense of Kawhia and Taranaki. It seems unlikely that density had previously approached that of ancient Taranaki.

NORTH ISLAND INTERIOR

The interior of the island had a very considerable population. The Matamata district and the Waikato-Waipā basin were thickly inhabited, especially along the river banks. It would seem that many lived near the lower Waikato where relatively few are indicated on the map. The number which clustered at various points along the Wanganui was possibly proportionally greater, although never approaching that of the Waikato. The population of the Taupo district was probably concentrated on the northern and eastern rather than on the western shores, but there is no reason to suppose it reached half that of the Rotorua district, where numbers were probably much greater than the map suggests. Nowhere else in the interior do the inhabitants seem to have been numerous, though the numbers living on the shores of Waikaremoana and in the Urewera valleys were not inconsiderable.

There is earlier evidence for the east coast, examined by Cook. The Bay of Plenty supported a dense population, and settlement may

¹⁰⁷E. Best: *The Pa Maori*; S. Percy Smith: 'History and Traditions of the Taranaki Tribes', *loc. cit.*; Walsh: 'The Passing of the Maori', *loc. cit.*; and W. H. Skinner: 'The Ancient Fortified Pa', *Journ. Polynesian Soc.*, Vol. 20, 1911, pp. 71-77.

¹⁰⁸Personal communication.

have been continuous between the coast and Rotorua. Pa were extremely numerous near Whakatane, and the littoral eastwards to East Cape probably held greater numbers than suggested. Many lived between Hick's Bay and Wairoa, especially in the Waiapu valley, around Tokomaru, Tolaga Bay and perhaps Poverty Bay, and on the

TABLE II
DISTRIBUTION OF POPULATION

LOCALITY	WILLIAMS'S STATEMENT	HAMLIN'S STATEMENT	DIEFFENBACH'S STATEMENT	PERCENTAGE ESTIMATE 1770
Northland and Auckland Isthmus	22,000	16,500	20,800	25
Firth of Thames	4,800	3,900	5,000	3
Bay of Plenty—East Cape	15,600	12,480	12,600	10
East Cape—Cape Kidnappers	27,000	30,720	(33,000)	19
Rotorua district	?	(10,000)	6,000	5
Taupo district	?	1,800	3,200	2
Urewera district	?	3,000	(3,000)	2
Waikato basin and west coast (Manukau to Kawhia)	18,000	18,000	24,000	12
Taranaki coast	(6,000)*	6,780	?	8
Wanganui basin	(5,000)	5,400	(2,400)	3
West and south coasts, Wellington Province	(7,000)	6,000	(5,000)	4
South Island	—	—	(2,000)	5
Scattered inland	—	—	1,920	2
TOTAL	106,000**	120,000	114,890	100

* The bracketed figures are not quoted as in the original statements but have been allocated to these particular districts by the writer. e.g. Williams says 18,000 lived in the 'neighbourhood of Entry Island' (Kapiti) which appears to include all from southern Taranaki to Wellington Harbour, and has been divided accordingly.

** Williams's statement appears to omit whole districts such as Rotorua and Taupo. This may well be the reason why his estimate is lower than those of Hamlin and Dieffenbach, though it refers to an earlier date.

Mahia Peninsula. The Napier district had apparently supported great numbers when huge pa such as Otatara were occupied, but does not seem to have been as populous towards the end of the eighteenth century. Cook's account does not indicate a numerous coastal popula-

tion south of Cape Kidnappers.¹⁰⁹ The inland Wairarapa seems to have been but thinly peopled.

SOUTH ISLAND

The South Island clearly supported few, but there are great variations of opinion about numbers and distribution. Rutherford and Skinner think population had never exceeded 3,000 and had declined since the extinction of the moa. Fisher thinks this much too low, and suggests 3,000 lived along the warm indented littoral alone.¹¹⁰ Duff, basing his opinion principally on the recovery of artifacts, considers there were at least 10,000 and probably 15,000.¹¹¹ These lived chiefly at Golden Bay, on the Waimea and Wairau plains, along the Kaikoura coast, at Kaiapoi, and in Banks Peninsula. Fewer lived along the south-east coast and in Westland.

CONCLUSION

The details of the pattern of distribution remain obscure. Yet broad agreement was shown by the most reliable early observers. Although the areas referred to are ill-defined and the localities mentioned by these early writers do not coincide, Table II was constructed by summarising and adjusting three early statements. A tentative impression of the percentage distribution about the time of Cook's visit is also included.

The available evidence thus indicates that the population was concentrated in the northern peninsula and east coast regions of the North Island, at Rotorua, in the Waikato basin, and along the west coast to southern Taranaki. Taupo, Wanganui, the Wellington west coast, and probably the northeastern seaboard of the South Island held secondary population centres. The total number in 1840 was about 120,000, but population had been severely reduced, perhaps more than halved, since Cook's first visit. Explicit knowledge awaits intense historical and archaeological research.

¹⁰⁹A. G. Bagnall and G. C. Petersen, in *William Colenso*, Wellington, 1948, p. 163, perhaps exaggerate the density of population on the east coast of the Wellington Province.

¹¹⁰Personal communication.

¹¹¹Personal communication. Duff considers that about ten times this number lived in the North Island.

THE DEVELOPMENT OF HYDRO-ELECTRIC POWER IN NEW ZEALAND

L. F. WITHERS

PRIOR to 1903 there was no national policy for the development of New Zealand's water-power resources, although as early as 1896 an Electric Motive Power Act had given authority to the government to make investigation into the possibility of utilising the waterways of the dominion for the purpose of supplying electric power to the gold-mining industry. Although other special acts of local importance had given powers to various authorities and companies to erect and operate electric power plants of various types, the Water Power Act of 1903 reserved to the Crown the sole right to use water power. As a result the only major scheme now operated by any local authority or company is that on the Waipori River, controlled by the Dunedin City Council, although there are many small hydroelectric plants up to 3,750 kilowatt capacity operated by various local bodies, companies and private persons throughout New Zealand.

THE GROWTH OF NINETEEN YEARS

The story of the development of hydroelectric power in New Zealand is thus, generally speaking, that of the growth of the system now the responsibility of the State Hydro-electric Department. The present installed capacity of all public supply generating plants is 676,000 kilowatts. The growth of this capacity over the past nineteen years is shown in an accompanying graph (*Fig. 1*). The fuel plant, approximately twelve percent of the whole in 1948-1949, comprises steam plant fired by coal and oil, and internal combustion engines, owned and operated mostly by the state and supply authorities.

Like all other fields of engineering, that of the hydroelectric power development has advanced with the times; not only in technique but also in the basic conception of what constitutes a sound economic development. One section of electrical engineering, for instance, that of transmission line design and construction, has made considerable advances and, provided the amount of power to be transmitted warrants it, distance is no longer the determining factor although it must of course remain an important consideration in the overall economic study of a proposed installation. Other improvements of

equal importance have taken place since 1904 and a continued progress in all branches of this important engineering feature of New Zealand's development may be confidently expected. Few of the schemes proposed in the 1904 report¹ to parliament have been developed as suggested because of these changed views, and it is likely that the future will see changes in developments now envisaged. Schemes have been installed that are not mentioned in the 1904 report.

The rapidly increasing demand for power requires a similar increase in the rate of collection of survey and hydrologic data. This information is being obtained from many parts of New Zealand at the present time. A brief description of some of the schemes now in use will serve best to indicate the growth of the demand for electric power and the changes that have taken place both in design and operation.

DEVELOPMENT AT LAKE COLERIDGE

The first major development undertaken by the government was at Lake Coleridge where the physiographic features provided one of the most simple and economical developments that could be conceived. The lake is situated at an elevation of 1,667 feet above sea level and within a short distance of its southern end the Rakaia River provided a natural waterway for the spent water from a power house on its left bank. The head of water available was 490 feet and no expensive dams or headworks were necessary. Furthermore, there was a potential demand for the power in Christchurch, about seventy miles away. Several small mountain streams, seasonally snow-fed from a catchment area of eighty-six square miles, supplied the lake, and the natural outflow was at the northern end into the Wilberforce River, a tributary of the Rakaia.

Initial development of this scheme took place in 1911 and comprised the piercing of the barrier between the lake and the Rakaia River, the installation of a surge chamber and pipe lines, and the erection of a power house near the river bank. Three horizontal type turbines driving three 1,500 kilowatt generators were installed at this stage, but the power house and headworks were designed for an ultimate

¹In 1903 the government engaged the services of Mr. L. M. Hancock of San Francisco to report on the hydroelectric power resources of the country and in the latter part of that year he made a rapid tour of New Zealand with Mr. P. S. Hay, Superintending Engineer of the Public Works Department. In 1904 Mr. Hancock's report to parliament was accompanied by a comprehensive report by Mr. Hay and this document remains one of the few published general reports on New Zealand's resources. Geographers will, however, remember the article by Dr. R. O. Buchanan in the *Geographical Journal*, Vol. 75, 1930, in which assessment was made of the resources and potentialities at that period.

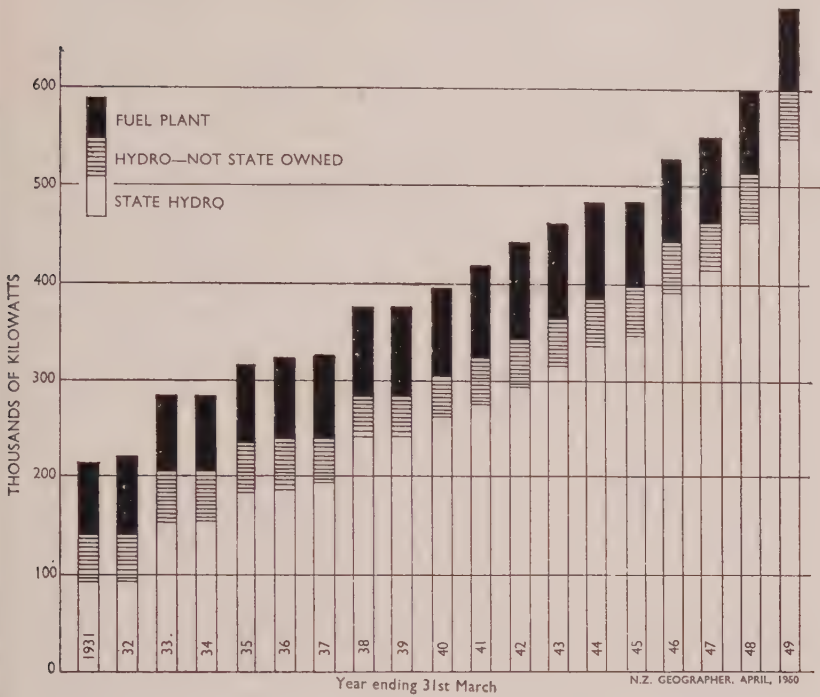


Fig. 1. Installed Capacity of Power Plant in New Zealand. Totals include all electric power generating plant used for public supply systems.

development of 12,000 kilowatts. The power was conveyed to Christchurch by two 66,000 volt transmission lines, a substation being installed at the suburb of Addington to control this power and reduce the voltage to 11,000 volts for transmission by underground cable to the city and, later, by overhead lines to areas outside the city.

EARLY DIFFICULTIES

Strange though it may seem, considerable difficulty was experienced in those early days in inducing people to take the new power. Frequent failures of supply, the result of faulty insulators, storms in the area traversed by the transmission lines, and other faults in the new equipment, were in part the reason for this reluctance. It is on record that one large freezing company agreed to take power on the basis of a price per frozen carcase of mutton or quarter of beef instead of the orthodox measurement of electric power by meter.

However, it was not long before people realised the benefits of electric power and the Lake Coleridge station was developed quickly to its full installed capacity of 12,000 kilowatts by the addition of one 1,500 kilowatt unit and two 3,000 kilowatt units. This was soon used up

and an extension was made to bring the capacity up to 27,000 kilowatts in 1926 and 34,500 kilowatts in 1930. To obtain sufficient water to supply these machines, the Harper and Acheron Rivers were diverted into the lake, increasing its catchment area to a total of 231 square miles, and utilising the storage capacity of a number of large snowfields, particularly in the basin of the Harper River and its tributaries.

The completed installation of four 1,500 kilowatt, two 3,000 kilowatt and three 7,500 kilowatt generators is the logical result of a growth in demand that could not be foreseen in 1911. Today such a power station would be built with two, or perhaps three, generators instead of the nine now in use, with consequent saving in operation and maintenance and a relatively lower cost per kilowatt of installed capacity.

HARNESSING THE WAIKATO

After the initial development at Lake Coleridge the government's next venture was the purchase in 1919 of the Waihi Gold Mining Company's hydroelectric power plant at Horahora on the Waikato River, and its extension in 1925 from 6,300 kilowatts to 10,300 kilowatts. This station, built in 1913 by the company, gave excellent service until it was covered by the water of Lake Karapiro in 1947.

In 1920 the Mangahao project was commenced and again the choice of site was dependent on the proximity of a major load, in this case Wellington, some sixty-three miles away. In 1925 the completed scheme was of 19,200 kilowatt capacity and the power was conveyed by 110,000 volt lines, a new step in the technique of transmission for this country. The scheme itself is of interest as it involves the use of three dams, two tunnels and automatic gates to provide the water for the turbines at a gross head of 895 feet. A catchment area of 32.6 square miles supplies the water.

In 1925 the Arapuni power scheme was commenced and was placed in service by 1929. A study of the construction of Arapuni provides a good illustration of the use that can be made of physiographic features. Briefly, the Waikato River was dammed at a point where it entered a narrow gorge. For the purpose of building this dam the river was diverted through a tunnel in the right bank, a gate being erected near the upstream end and suitable coffer dams installed. A former channel of the Waikato located at a higher level and close to the edge of the present gorge was used to convey the dammed-up water to a forebay above the power house. From this forebay eight

pipe lines were driven down through the wall of the gorge to the turbines in the power house situated in the bottom of the gorge.

The output of this station is dependent on the flow in the Waikato River, the principal source of which is Lake Taupo. Initially, and for some years after the station was placed in service, the natural flow of the river governed the output from the station. In 1941 gates were placed at the outlet of the lake and river flow from that source is now controlled. Lake Taupo is supplied from a catchment area of more than 1,200 square miles and is the largest natural storage lake in the North Island. Including the lake itself, the total catchment area providing water for Arapuni is nearly 2,700 square miles.

INTERCONNECTION OF NORTH ISLAND STATIONS

Auckland was the first major consumer of power from Arapuni, and for some years in company with Horahora, this station supplied bulk power to consumers in the Auckland Province only. The planned interconnection of all power stations in the North Island was soon to be effected, however, and for years now all state hydroelectric power stations have been coupled together by means of 110,000 volt transmission lines which permit a much more efficient use of the available storage of water in Lakes Taupo and Waikaremoana and of the varying rainfall in the catchment areas.

Situated at 2,000 feet above sea level Lake Waikaremoana provides for three power stations, using the same water. The catchment area supplying the lake is 165 square miles in extent. The lake was formed by a slip which blocked the drainage way of the inland catchment. The slip was porous and until recently the only source of water for operating two of the three power stations now in service was the leakage through the slip and the water brought over the slip debris by siphons which were employed to increase the flow when the lake was very low. The completion of the third station at Kaitawa, coincided with the completion of a tunnel through the slip to by-pass the leaks. These are now being sealed so that all water used will pass through all three power stations under normal conditions of operation.

The first station built, Tuai, has an installed capacity of 52,000 kilowatts. The second station, Piripaua, below Tuai, is rated at 40,000 kilowatts, and Kaitawa the third station, above Tuai, at 32,000 kilowatts. An interesting feature of these three stations is that both Piripaua and Kaitawa can be remotely controlled from Tuai. Thus the Tuai operator

controls an output of 124,000 kilowatts. Operation of Tuai commenced in 1929 and Kaitawa, the last station to be built, was completed in 1948.

To provide for the rapidly increasing needs of the South Island a project was commenced in 1928 near Kurow on the Waitaki River. This development, placed in commission in 1934 represents another interesting method of harnessing water power in New Zealand.

An arched gravity dam was erected, bedded on greywacke, its total length being 1,650 feet. The power house was built on the downstream side, one wall being the dam itself. Except for the length occupied by the power house, the whole of the dam forms a spillway. In order to construct this dam the river was moved across the wide bed as construction proceeded until finally it was passing through openings or sluices left in the dam. These openings were then closed and a lake was formed which provided a head of seventy feet. The plant capacity is 75,000 kilowatts and the power is transmitted at 110,000 volts to Glenavy near the coast where it feeds into the South Island power system.

The total capacity of hydroelectric power plant at 31 March 1949 owned by the government and by private concerns and used to supply power to the public supply system, was 594,000 kilowatts, 406,000 kilowatts being in the North Island and 188,000 kilowatts in the South Island.

However, installed capacity of hydroelectric plant is only one side of the story. Equally important is the number of units of electricity the plants can produce. The annual production of hydroelectric plants, both state and those operated by other authorities, has been rising steadily, and for the year ended 31 March 1948 a total output of 2,479 million units was recorded. If the units produced from coal and oil plants are added, a grand total of 2,599 million is recorded. Of this total, 2,035 million units were delivered to consumers throughout New Zealand, the difference of 564 million units representing transmission and distribution losses, units used for power station auxiliaries, and similar non-productive units. The loss amounts to 21.7 percent of the total generated.

To appreciate what these 2,599 million units mean, a computation in terms of coal is illuminating. The amount of coal required to generate this power in modern power stations would be approximately two million tons at $1\frac{3}{4}$ lbs of coal per unit. The losses would remain about the same, because, to use the coal most economically the steam

stations would be erected at or near the coal mines and transmission lines would be required. The total amount of coal mined and imported into New Zealand up to date has never exceeded 2,900,000 tons per annum, and the shortage of coal today is a major problem in this country. The principal coal-burning power station is at King's Wharf in Auckland and its consumption for the year 1947-1948 was 50,000 tons at the average rate of 2.8 lbs of coal per unit produced.

Perhaps an even better appreciation of the rate of growth of

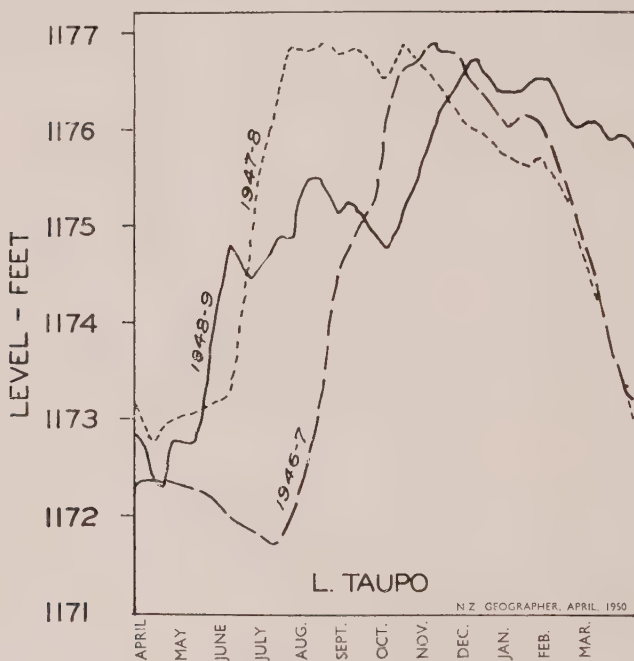


Fig. 3. Average Weekly Water Level in Lake Taupo.

consumption of electricity is provided by the statement that, except for the recent and continued period of rationing, this growth has been at the rate of approximately ten percent per annum. This means that the capacity of plant to handle the growing demand must be doubled almost every seven years—a formidable task, quite apart from meeting the pent-up demand which has developed in recent years.

DISTRIBUTION OF POWER SITES

The existing distribution of power sites and the pattern of transmission lines of the national power system, together with the develop-

ments at present planned, are shown on the map (Fig. 2). The Waikato supplies the greatest portion of the power used through the two plants at Arapuni and Karapiro. Control of the gates on the outflow from Lake Taupo permits conservation of water during low load periods and makes possible an increased flow in the river for peak demands. To avoid the very serious effect on industry, commerce and the private individual, it is necessary to maintain a very careful and accurate control of river flow. The installation of the 180,000 kilowatt station at

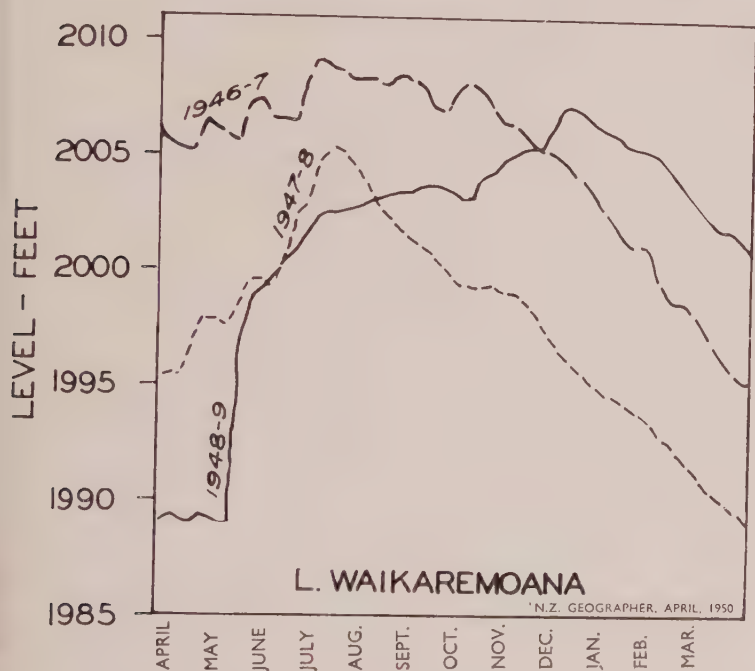


Fig. 4. Average Weekly Water Level in Lake Waikaremoana.

Maratai will provide a further 860 million units per year from the same water resources and, as the remaining seven stations are added, control of the flow will become more and more important, but *pari passu* more and more value will be gained for each foot of water stored in Lake Taupo. A foot of water in Lake Taupo is today a potential producer of 36 million units. When all ten stations are in service a foot of depth in the lake will be worth 110 million units. The graph (Fig. 3) shows the average weekly water level of Lake Taupo for the past three years. Likewise Lake Waikaremoana provides a valuable storage basin, a foot of water there being worth 12.5 million

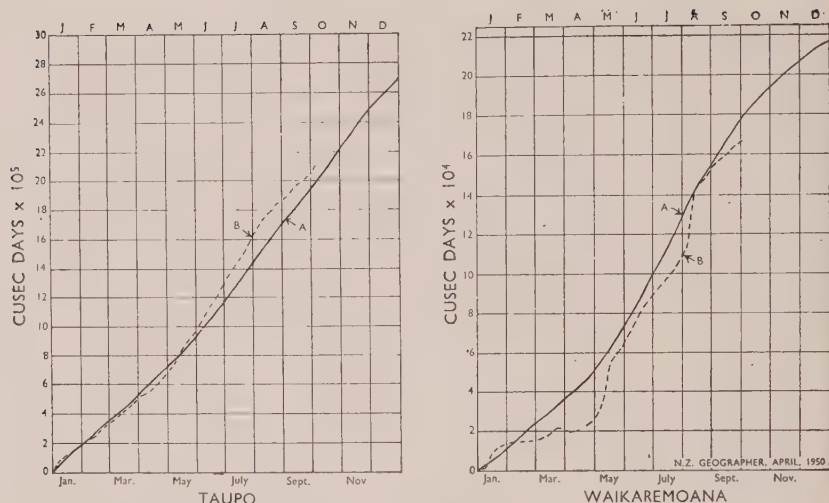


Fig. 5. Cumulative Flow into Lakes Taupo and Waikaremoana. Curve A represents the average, curve B the inflow during the first nine months of 1949.

units. The average weekly level of Lake Waikaremoana is shown on the graph (Fig. 4) for the same period as that for Lake Taupo.

Although it is not possible to forecast what will happen with lake levels for more than a few days it is possible to study trends. The graph (Fig. 5) shows, for the Taupo and Waikaremoana systems, the cumulative flows for the year 1949 to the beginning of October (curve B). Curve A is the average taken over many years. For the first nine months of 1949, the inflow at Taupo was a little better than average whilst at Waikaremoana it was below average.

In the South Island the present schemes (which are interconnected) are at Lake Coleridge, Waitaki River, Lake Monowai, Arnold River and Waipori, the last being operated by the Dunedin City Council. Three large lakes are at present wholly or partially controlled to provide storage against periods of low river flow. Lake Coleridge, and Lake Mahinerangi feeding the Waipori station, are completely controlled, whilst Lake Pukaki, which supplies the Waitaki River, has limited control pending the completion of the dam and spillway now under construction. Tekapo, one of the two other lakes supplying the Waitaki River, is being equipped with control works in the form of a power station which will take water from the lake to a point in the river where an available head of a hundred feet can be utilised to provide a 25,000 kilowatt output.

The Waitaki River, fed principally from Lakes Tekapo, Pukaki and

Ohau, is supplied from a catchment of about 3,200 square miles. Possible future power stations on this river will still further increase the value of water stored in the lakes. The limited storage now available makes very careful manipulation of these facilities imperative and a dry season may force still more restrictions on consumers. It is for this reason that every effort is being made to complete these control works early.

A 12,000 kilowatt plant at Cobb, which is being extended to 32,000 kilowatts, is the principal source of supply to the Nelson and Marlborough areas, but is not yet connected to the South Island network.

POWER TRANSMISSION

Power stations would be almost useless were it not for the transmission lines and substations provided by the department and the distribution systems provided by the power boards and other supply authorities. In the design and construction of transmission lines the nature of the country is studied closely. The varying climatic conditions, the surface configuration and the type of country must be taken into account in deciding the route of the line. Salt-laden winds and gales and snowstorms in exposed positions must be considered in the designing of transmission systems. Swamps require special and expensive foundations, rock must be excavated with special equipment, and forest must be avoided or a track cleared through it.

The quantities of power transmitted and the distances involved have dictated an increase in voltage—from the 110,000 volt lines (at present the maximum in use in New Zealand) to the 220,000 volt lines which are now being constructed.

Substations contain the control equipment for the high voltage lines, the transformers to reduce the voltage, and the switchgear to control the distribution lines erected by the power boards and other supply authorities. These substations are manned by staff which maintains the equipment in good operating condition and which, above all, has as its principal aim the maintenance of a continuous power supply to the consumer. Resident operators maintain and operate the equipment, whilst resident linesmen maintain the transmission lines, clear tracks for access, test the insulators, and maintain bridges across creeks and rivers. This team is on call at all times.

Long before the design of a power scheme is commenced investigation is made of the history of river flow and rainfall. Careful study

of the country in the vicinity of the proposed station is undertaken and, after consideration of geological reports, a series of bores is drilled to locate rock and ascertain its depth, quality and thickness. If rock is found, tunnels are driven to selected points and samples are removed and tested for shear and compressive strength, elasticity, porosity and permeability. Petrological examination is also made to determine possible chemical reactions. Boring and tunnelling are now proceeding at the Atiamuri and Waipapa power sites on the Waikato River and at Benmore on the Waitaki River, whilst preliminary reconnaissance surveys and the collection of data are proceeding on the Kaituna River.

PROBLEMS OF TERRAIN

Rock is not essential for power schemes. Earth dams have been and are being built in this country and an interesting story could be told of the method of making these structures. The technique of construction has advanced with the times and with the improved tools for the work. Alluvial gravel and moraine deposits are not easy to tunnel and much of this type of country is encountered in the South Island. The Lake Coleridge power scheme has two tunnels, built by using timbering to support the morainic materials. Tekapo, now being built, has a tunnel installed by the use of steel shields which were thrust forward with the excavation by means of hydraulic jacks.

The maintenance of a constant supply of power requires reliable, rapid and efficient communication. Telephone and radio links provide this service and the State Hydro-electric Department maintains an extensive system. All power houses, substations, line depots and offices are connected by wire lines, and radio is used in certain areas to ensure continuous communication. Wherever power transmission lines go telephone lines go with them, sometimes on the same poles, sometimes on separate poles. Telephone huts are provided at selected points to provide facilities for line maintenance crews to report.

With the growth of load and the increase in the number of power stations interconnected, central control of output and coordination of maintenance work on equipment is essential. In the North Island a System Control Office is established in Hamilton which issues instructions to the several power stations about the output required, to the operator of the gates at Lake Taupo so that he may alter their position on demand, and to various substations in order that they may carry out the switching of lines as required. This central control office also

receives reports on weather, lake levels and river flows. Requests are made to it for the release from service of generators, transformers, switchgear and transmission lines so that overhauls and repairs may be carried out. By coordinating this work with power system demand the minimum of interference is caused to consumers. A South Island System Control Office is established in Christchurch with similar responsibilities. Control of storage in Lakes Coleridge, Pukaki, Monowai, and Mahinerangi is one of its cares. Sudden failures of equipment, fortunately rare in New Zealand, often demand rapid decision from these System Control Offices in order to reduce the duration of the period of supply failure.

The staff of the System Control Offices have, along with all other personnel associated with the maintenance of electric power supply in New Zealand, a prime object—the continuous flow of power to the consumer. Although under normal conditions this involves steady and unspectacular work with overhauls, tests and repairs, the occasions inevitably arise when sudden breakdowns caused by storms, earthquakes or other unforeseen incidents occur. Then the real spirit manifests itself in the effort made by the linesman, the fitter, the operator and the engineer to restore the service. The building-up of a team of power supply experts or specialists both in field and office is just as important a part of the development of hydroelectric power in New Zealand as is the increase in the number of power stations, transmission lines and substations.

POWER IN SECONDARY INDUSTRY

Practically all secondary industries in New Zealand use electric power from a public supply system and the rapid growth of these industries has been assisted or hampered according to the availability or otherwise of cheap power. The majority of farms today are also supplied with electric power and, particularly in the dairying industry, this provision has materially affected both the total production of primary products and the life of the farmer and his family. The present horse power available from public supply systems is nearly 0.5 per head of population, and when projected plants are installed during the next seven years it will reach more than 0.8 per head. These seven years will constitute a period of unprecedented activity in the harnessing of the dominion's water resources.

PHOTOGEOGRAPHY

A PICTORIAL SURVEY OF NEW ZEALAND

5. POWER: BASIS OF PROGRESS

Fig. 1. Transmission Lines traverse the Rural Landscape. Hydroelectric power and abundant pasture growth, both here near Cambridge and throughout New Zealand, are important bases of the dominion's contemporary prosperity.



All photos: National Publicity Studios

Fig. 2. THE DAM
SITE

ite of proposed
oxburgh Dam,
al Creek,
lutha River,
entral Otago.



Fig. 3. THE PROJECT BEGINS

*Surveyor at work on new dam
site, Maraetai, Waikato River.*





Figs. 4 and 5. THE STATION COMES TO LIFE

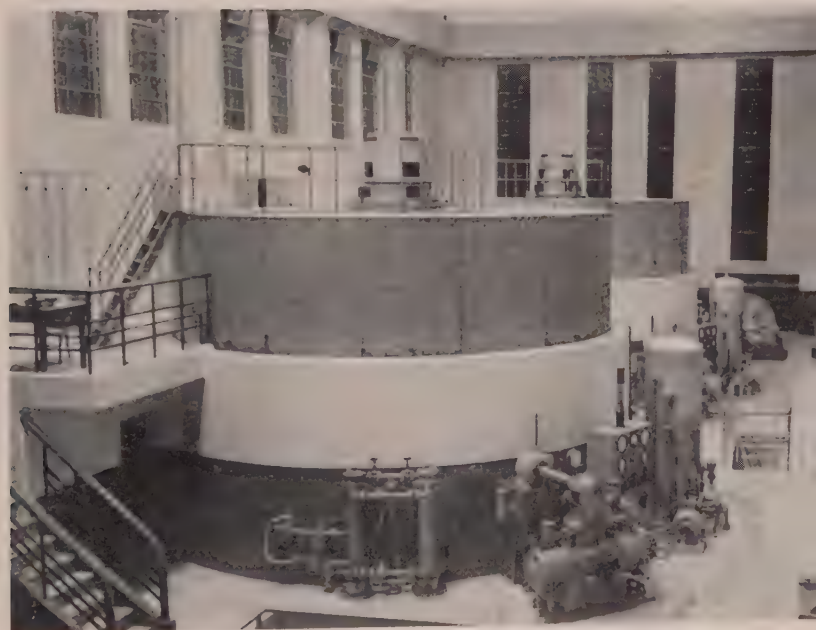
The latest addition to the hydroelectric installations in New Zealand is Karapiro, Waikato River. Work proceeded night and day until completion in 1948. Karapiro not only generates 90,000 kw. but also contributes to the beauty of the landscape.

6, 7 and 8.
 VER IS
 ERATED

the dam on the
 itaki River,
 th Island.



erators at
 aua,
 karemoana.



ric Current
 es Arapuni.





Figs. 9, 10 and 11
POWER—
ON THE FA

Transmission



In the Workshop



S. 12, 13 and 14.
POWER—
THE FACTORY



Mass Production



—IN THE HOME

Domestic Supply

IN TRANSPORT



*On the Electrified
Section of the North
Island Main Trunk
between Paekakariki*

THE CONDITION OF THE SHEEP-FARMING INDUSTRY IN NEW ZEALAND*

DAVID McLEOD

THE PUBLICATION of the *Report of the Royal Commission on the Sheep-Farming Industry* brought to an end an investigation which lasted more than two years, if account is taken of the preparation of evidence in the various districts. It was the most extensive investigation of its kind in this country and produced, naturally, a very comprehensive report. To read this report is within the power of everyone; and according to his viewpoint, satisfaction, disappointment or astonishment will be the result. Without criticism or approval, an attempt is made here to analyse the problem and the report, so that all New Zealanders may trace the steps by which this report has come to take its final shape.

As long ago as 1920 the Southern Pastoral Lands Commission sat to report upon the deterioration of the grazing lands of the South Island. There was a problem then, but it was not realised that the same problems of deteriorated, depleted and eroded land might be common to the whole of New Zealand, nor was their ultimate consequence—the final destruction of the food-producing capacity of the land—appreciated.

The conclusions of the Southern Pastoral Lands Commission were largely disregarded and forgotten and it was not until another spectre menaced the country that the problems were again, and more seriously, considered. This time the economic collapse of the early 1930's brought the country face to face with bankruptcy. Curiously enough this in itself was not the thing which suggested the need for an investigation; it was the policy pursued after the recovery from the slump—the accelerated change in New Zealand from a predominantly pastoral to a more diversified economy—which brought to the farmers on the less productive lands the realisation that they might in future be regarded as the least significant part of a decadent system. They might be henceforth the last resort of the most inefficient labour, the worst served by ever increasing amenities, political outcasts too unimportant to be protected.

On top of this fear came the awakening of the United States to its soil erosion problems, and the sudden realisation that soil destruction was rampant here. It was these things that led to the setting up of the Sheep-Farming Commission of 1939. Its work was interrupted by the war after it had made only preliminary investigations.

The desire for a full report was kept alive amongst the fine-wool growers of the South Island during the war by the fixing of the values of commandeered wool on a scale based on the prices immediately prior to the outbreak of war. This scale subsequently proved to be too low and resulted in a depressed economy for the high

*This constitutes an article reviewing the *Report of the Royal Commission to inquire into and report upon the Sheep-Farming Industry in New Zealand*, Wellington, 1949. (See *Appendices Journ. House of Representatives*, H-46A, 1949.) Certain aspects of this report, particularly its reference to the dominion's soil erosion and conservation problems, are reviewed elsewhere in this issue. See 'Has New Zealand a Soil Erosion Problem?' in *Notebook* below.

country during the whole of the war period. It kept the occupiers thoroughly apprehensive of the future. The position in the North Island was not so bad economically, but even there the greater amount of labour required for scrubcutting, the high cost of fencing and fertilisers, and other rising prices were making the hill-country farmers equally anxious about their future security. That there is a basis for the apprehensions is unassailable. One has merely to discuss with the farmers of tomorrow, the lads of eighteen to twenty years of age, the type of farm they hope to own to appreciate how wide is the gulf between the present and the days after the 1914-1918 war: then it was a nice piece of sheep country, a good flock of sheep, dogs, horses and no arable agriculture; today it is a mixed farm, a tractor, good machinery and no labour. And so the commission was set up in August 1947 with the support of the sheep farmers, support given on the understanding that the main object would be the investigation of the deteriorated lands of the dominion.

The commission travelled far and wide, saw and heard practically everything and every person brought to its notice. It had access to departmental information and there was prepared for it an almost bewildering mass of facts and figures. After about half the work had been completed, it became apparent to the commission that two problems of outstanding importance required immediate action, and it brought out in June 1948 an interim report making two recommendations to the government. Firstly, to protect the North Island hill country, action should be taken forthwith to correct the disastrous increase in the price of fertilisers. A reduction to £7 per ton ex works was recommended. Secondly, the Commissioner of Taxes should be empowered to create for high-country sheep farmers tax-free reserves against losses of sheep by snow thereby permitting them to accumulate a reserve to carry them over periods of low income resulting from decimated flocks. The urgency of this was the outcome of the sudden rise in the value of fine wools, itself the result of a return to auction sales. These high prices were regarded as temporary and it was considered unfair that a large proportion of the sheep farmer's income should be lost in taxation when money was so badly needed to rehabilitate the industry. After the presentation of the majority of the evidence, but before the commission had begun the preparation of its report, the government took three steps which had a direct bearing on the commission's order of reference, presenting them with a *fait accompli* on three major aspects upon which they were expected to make recommendations.

The first was the alteration of the exchange rate which reduced the earning power of primary produce by twenty percent. The second was the valuation of the Land Court Act. The third was the Land Act of 1948. This last in particular swept over the head of the commission to establish a new order in a field which was its express concern. The extent to which these actions modified the commission's proposals is impossible to determine, but it must certainly have been considerable.

Yet it becomes clear from reading the main report that the commission itself has set certain limitations on its field of enquiry. Whether these arise from a set purpose or a failure to agree is impossible to say. The fact remains that upon certain subjects which were heavily stressed in evidence the commissioners have been completely silent. Outstanding among these is the economic structure of the industry. This was naturally the subject of extensive evidence and might have been expected to receive a

corresponding position in the report. It may be that the commission considered that the board which it proposed for the administration of the industry would be the proper body to examine costs, but the value of the report for future reference would have been greatly enhanced by an authoritative survey of the cost of production at the present time. Again, the future marketing of wool was an important part of the case submitted for the high country and the commission has made no recommendation in this respect.

In its report the commission early recognises the importance of the social influences which are jeopardising the future of hill-country farming. A striking and passionately-worded portion of the introduction reads, 'Let not the brilliance of the sheep industry's progress and prosperity on first class lands dim our vision of the hardship in remote areas. Let us set our hearts on the task of bringing the cheering warmth of a new hope to these back country people. With that hope, let us send to them the comforts of a modern life—education, electricity, access to doctor and nurse, those important things which mean more than a world to the mother of a family in the back country'. In other words, the commission has affirmed that in any pioneering of social services one section of the community cannot be disregarded. Education is not free to those who *must* board their children. Medical attention is not free to those who must pay for 150 miles of travel to get to it. The compensations of living on the fringes of civilisation appeal only to a few, and of those few practically none are women; and places to which women will not go will eventually be abandoned.

The second part of the report makes recommendations on the administration of the industry. The first of these deals with the organisation of the industry within itself. Impressed with the efficiency of the administration of the dairy-farming industry it recommends a Sheep Industry Board embracing the present Wool Board with all its functions and many more. The Meat Board is to retain its existence and method of election so as to act as a marketing authority for meat. The country is to be divided into eight wards and eight producer members of the Sheep Industry Board are to be elected by Ward Electoral Committees. In the election of these committees each sheep farmer will have one vote for each sheep he owns.

This proposal is designed to promote efficiency in research and control of the industry and to represent the industry to the government. It has been found that ministers and governments deal more readily with statutory boards than with pressure groups, no matter how well these latter represent their supporters. In addition, the commission has endeavoured to circumvent to some extent the inevitable tendency for the more numerous and more successful farmers on better class land to secure control and to interpret the needs of the industry without due regard to the welfare of the back-country farmer. An instance of what may happen is the approval by the New Zealand Meat Board and Federated Farmers of New Zealand of the removal of subsidies on fertilisers in 1947 in exchange for an increase in the stabilised price of meat. The effect upon the store-sheep farmers of the North Island was not properly considered and the decision proved to be unacceptable to them.

The proposal for a Sheep Industry Board is also partly the result of a desire for rationalisation and an eagerness to see everything neatly planned and dovetailed;

but it has come up against a very natural obstacle—the unwillingness to change something which is working pretty well. The Meat Board has its enemies, but they are more anxious to see its policy altered to suit them than to see it weakened. The Wool Board is new and popular and the Electoral College has taken its place in the present scheme with considerable success. Why change all this when perhaps any necessary improvements could be made by developing the present system?

The next essay in planning concerns government departments and is likely to have more support. The report proposes to put the control of all research and fieldwork into the hands of the Department of Agriculture, and so enable it to direct the agricultural work done by the Department of Scientific and Industrial Research and the agricultural colleges. This is, to the reviewer, a piece of common sense which would probably receive support but for the close contacts which certain individuals in the Department of Scientific and Industrial Research and the colleges have made with farmers. Their work and their relations with farmers have been excellent and some will be reluctant to see them put under the direction of the Department of Agriculture.

At this point some mention must be made of a proposal which has been widely criticised, namely that all reports on scientific work should have the approval of the Directors-General of Agriculture and Lands. This has offended many scientists and has been attacked as impracticable, which it probably is. The suggestion was made because bulletins have been published under the authority of government departments containing information which the commission believed to be grossly misleading and written by men not fully qualified. This so alarmed the commissioners that it led them to propose the restriction referred to.

A reorganisation of the Department of Lands is envisaged in the proposals on marginal lands. These lands are defined as 'those which, over a long period of years, would yield a sufficient production to provide an economic gain to the nation if developed, but for which the return in the short period would not be sufficient to enable the ordinary individual farmer to carry out the development'. Clearly the commission has in mind the large area of hill country in the North Island which with topdressing, surface sowing, scrubcutting and subdivision may be improved far beyond its present productive capacity. In order to develop and finance these projects it proposes to set up a Marginal Lands Board with a constitution rather similar to the Land Settlement Board set up under the Land Act of 1948. It will be administered and staffed by the Department of Lands and will have district Marginal Land Committees. This is an ambitious project which could do much to develop the productive capacity of the dominion if sufficient funds were available for its operation. A notable feature of this proposal is that it would extend the jurisdiction of the Department of Lands to cover freehold land.

The most controversial proposal in the report is that dealing with the future of the Soil Conservation and Rivers Control Council. The recommendations reflect the revulsion produced by deliberately alarming publicity designed to awaken the public to the danger of soil erosion; the failure of the scientists to convince a body of laymen, predominantly farmers, that their contentions were accurate; disapproval of the attitude revealed by the evidence of certain soil conservation officials; and the same

desire for rationalisation and orderly control which characterises the report throughout. It has been publicly admitted that certain bulletins and speeches were couched in extreme terms in order to awaken an apathetic public to a very real menace. These terms the commission regarded as tantamount to perversion of the truth, and the organisation chiefly responsible, the Soil Conservation and Rivers Control Council, became suspect. The accusation of alleged scientific inaccuracy is illustrated in the report by one specific case, though it is indicated that there were other instances where a similar conclusion was reached. This instance, the Orari Catchment area, hinged on the clash between the scientists' statement of the loss of soil and the practical farmers' judgment of the condition of the pasture.

Considerable alarm had been expressed by farmers that the Soil Conservation and Rivers Control Act provided no means by which compensation could be paid to a man who was financially embarrassed or ruined by orders made by soil conservation authorities. This meant that an occupier of a depleted property might be forced to vacate the whole or part of it without compensation whether or not the depletion was his fault. The chairman of the Soil Conservation and Rivers Control Council stoutly defended this interpretation on the grounds that farmers might wilfully damage their lands if they had the right to compensation. When he was supported by the chairman of a catchment board, the commission evidently became alarmed also.

Finally the whole organisation set up under the act appeared to be cumbersome, expensive and of doubtful efficiency. In the case of Crown lands the authority which administered the lands appeared to be the most suitable body to make responsible for their care and preservation. If that was the case, would it not be simpler to hand the whole thing over to the Department of Lands and let them take charge of soil conservation throughout the whole dominion? Catchment boards appeared to result in excessive duplication of staff and machinery and in a lack of uniformity in policy and action.

The commission recommended therefore that catchment boards should be abolished; that a special Land Conservation Division be set up within the Department of Lands to be responsible for '*land* conservation' on *all* lands; that land conservation and river control should be divided and the latter placed under a Rivers Control Council; and that a special authority be created for the Poverty Bay-East Coast area.

These proposals have been widely attacked and certain sentences from the report have been shown to be of doubtful accuracy. It is unfortunate that, when one authority is criticised for distortion of the truth, any shadow of the same accusation should rest upon the accuser. The public has been educated for nearly ten years to look upon its heritage as slipping into the sea. It is too much to expect it to accept overnight the statement that such is not the case.

The third part of the report surveys farming problems, and the commission states that it has endeavoured to give effect to four points put forward by the High Country Committee; namely, the regrouping of badly-subdivided country; the safeguarding to the tenant of the value of his improvements; the encouragement of good husbandry; and the setting up of a tribunal to protect the rights of the grazier. The first problem is dealt with under a special scheme. The second, in the opinion of the commission, is covered by the terms of the new leases offered under the Land Act of 1948, provided

that pastoral run licences are, in fact, converted into pastoral leases. (The act provides a loophole for the Crown to deny this right.) The commission approves the drafting of a more effective good husbandry clause instead of the penal one laid down by the 1948 act, but does not attempt to draft it.

Among the recommendations relating to tenure is one that endowment leases, the majority of which are administered by the institutions concerned, should be resumed by the Crown, other sources of revenue being provided as compensation. Of necessity these endowments have been made to provide the maximum of revenue irrespective of the productive capacity of the land. This accusation has often been levelled, with not so much justification, at the Department of Lands.

There follows a section on Maori lands which will repay study by those interested either in the Maori or in increased production. A long quotation from evidence sets out the appalling complications which result from the traditional Maori outlook towards ownership of land, and finally the commission is left with the conclusion that it does not feel competent to pass judgment and that another authority should be set up to deal with this vexatious problem. A warning shot is also fired at the farmer who wilfully neglects his land. Horrified by the sight of good farming land overwhelmed by a mass of gorse and other noxious weeds, the commissioners suggest that power be given to the Director-General of Lands to purchase such misused land compulsorily at a Land Court valuation.

The report then turns to the condition of the land and considers again the question of the price of fertilisers, and the quantity available, and outlines a development plan for their increased production and use. This is followed by a survey of depleted pasture land, in which the 1920 report of the Southern Pastoral Lands Commission is extensively quoted. To quote in this way has been criticised as showing a lack of initiative, but that is hardly fair since the section also sets out in part the very sketchy attempts which have been made to study the problem since then. The dictum that the skilled sheep farmer should know best when to burn his run may be true, but up to now nothing has been done to ensure that only skilled sheep farmers occupy runs.

The reference to rabbits is brief, not because they are regarded as unimportant, but because it is considered that the Rabbit Destruction Council had the matter in hand and therefore deserved full support. A significant paragraph closes the subject: 'The rabbit is the chief factor in depletion and it is of little use taking any steps to reestablish a soil cover before the rabbit has been cleared. All possible research, however, should be undertaken so that when the destruction of the rabbit is complete the Department of Agriculture will have a range of plants with which to reclothe the ground, that it will know from research how to go about such reclothing, and that there will be available all the seeds necessary to do the job. We are not satisfied with what is being done at present in agricultural research'.

Of the major farming problems weeds are dealt with at the greatest length. One hundred years of occupation has resulted in the importation of a large number of objectionable weeds and the commission is impressed with the grave danger of allowing the spread to continue. It endorses the recommendations of the 1945 committee which suggested control by local authorities. There is some irony in the

revelation that farmers in the Nelson district defended gorse as a desirable pasture plant!

Taxation is dealt with in this part of the report. Arising from this the interesting recommendation is made that 'farmers' breeding stock should be treated as capital'. It has been the practice in New Zealand since 1929 to treat all livestock as trading stock, so that any increase in the number or value results in profit for taxation purposes and any decrease in loss. Recent increases in livestock values have left many farmers with the book values of their stock lagging far behind the true value. Unwilling to incur extra taxation by writing them up, they have reached the position in which a sale or death would produce in one year a staggering profit which would be taxable in that year. The means of escape suggested is to treat the stock as capital, in which case any increase would not be taxable. It is rather naive to suppose that a vigilant Commissioner of Taxes would permit those who are already in this position to escape so easily. Moreover another aspect must be considered. The high country is liable periodically to heavy losses of stock from snow. These losses take many years to make good since the breeding capacity of high-country flocks is low. The right to treat that loss of stock as trading loss and to carry it forward for three years is very valuable to the runholders and cannot be lightly surrendered.

The final section of the report discusses such problems as the drift of population to the towns, housing, education, telephones and electric power. That these have a major effect on the economy of outlying districts may not be as fully appreciated as it should be. As long as it remains impossible for a married pastoral worker, so long as he remains in the back country, to give his children the opportunities enjoyed by other children in the dominion, the services of the most valuable workers will be lost.

Here, the commission's failure to survey the economic side of the industry becomes particularly unfortunate. The whole future of the back-country districts depends upon their ability to produce more than a bare subsistence. The cost of providing them with services and amenities sufficient to keep them in production must be weighed against the value of this production to the dominion and against the consequences of allowing them to become derelict.

The general picture presented by this report is of a sheep-farming industry strongly organised within itself and giving special care and protection to the interests of the farmer on poor country. It proposes to strengthen the authority and responsibility of the Department of Agriculture which will then be able to direct and control all research in consultation with the Sheep Industry Board. It recommends an even greater extension of the power of the Department of Lands to cover the development of all marginal lands, both leasehold and freehold, and the control of soil conservation on all lands. Although it makes many recommendations on important problems, it leaves to the organisations thus proposed the main task of safeguarding the future of the industry.

In all, the commission has suggested the means whereby most of the needs of the sheep farmer may be met, but much will depend upon the energy and initiative with which the two state departments tackle the problems within their respective provinces.

NEW ZEALAND GEOGRAPHICAL SOCIETY: BRANCH AFFAIRS

CANTERBURY BRANCH

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Recorder: Mr. M. McCaskill

Committee: Miss N. Clark, Mr. A. C. Pitcaithly, Mr. A. J. Rose, Dr. G. Uttley

The tenth annual general meeting of the Canterbury Branch in 1949 featured a Brains Trust Discussion on 'The Drift of Population to the Towns'. The panel of speakers consisted of Mr. J. W. Earl, Mr. L. W. McCaskill, Mr. C. R. Straubel and Mr. H. C. Urwin, with Mr. H. J. Critchfield as question master. As in previous years the evening produced active discussion and was voted most successful.

Meetings are held at 8 p.m. on the second Wednesday of each month from March to October inclusive in Hay's Lounge, Gloucester Street. Visitors are welcome at all meetings.

We wish Mr. J. L. Hewland, who is spending a year in England on teacher-exchange, a pleasant and profitable stay.

WELLINGTON BRANCH

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Committee: Mrs. J. K. Bemley, Mrs. G. S. Turner, Mr. R. P. Graham,
Mr. A. J. Sligo

The 1950 lectures will be held in the third week of each month from March to October in the Lecture Hall of the Wellington Central Library. Two film evenings will be held and in addition an evening will be devoted to a display of geographic material at the Department of Geography, Victoria University College.

A number of outstanding speakers have agreed to address the members of this branch, and a programme will be published at an early date. The emphasis will be on overseas rather than on New Zealand topics.

AUCKLAND BRANCH

OFFICERS for 1950 are— *President:* Dr. Gilbert Archey

Vice-Presidents: Sir Albert Ellis, Professor V. J. Chapman, Mr. W. R. McGregor,
Mr. L. K. Munro, Professor H. R. Rodwell

Chairman: Mr. N. Pountney *Deputy Chairman:* Mr. A. R. Harvey

Hon. Secretary: Mr. R. G. Lister *Hon. Treasurer:* Mr. L. L. Pownall

Hon. Auditor: Mr. J. K. Bedbrook *Recorder:* Mr. L. Lucena

Committee: Mr. G. G. Harvey, Mr. L. Kearney, Mr. J. Martin, Mr. R. A. Watson,
Mr. A. L. Ferguson

Council Delegate: Dr. E. P. Neale

At the annual general meeting of the branch in October 1949, Professor H. R. Rodwell delivered the presidential address on 'The Geographic Factor in Settlement' taking North Auckland as his special study.

A steady increase in branch membership over the 1948 figure was recorded by the end of 1949. Branch meetings in 1950 will be held on the first Tuesday of each month, with film evenings alternating fortnightly. Lectures so far arranged include an address on the work of New Zealand Forest Products, a review of problems and recent developments in electricity output in Britain and western Europe, and an analysis of the phosphate problem in New Zealand.

The branch has undertaken to join in the local UNESCO campaign on the central theme of 'Food and People' which is to be launched throughout New Zealand in March. Branch representatives will take part in radio discussions and panel groups, and the monthly meeting in May will be in the form of a public meeting sponsored by the society. On this occasion Dr. C. P. McMeekan will give an address on the work of the Ruakura Animal Research Station in relation to New Zealand's food production.

OTAGO BRANCH

OFFICERS for 1950 are— *President:* Mr. B. J. Garnier

Past-President: Dr. B. H. Howard

Vice-Presidents: Mr. P. G. Connolly, M.P., Mr. A. H. Payne, Mr. G. Simpson

Chairman: Mr. W. E. Earnshaw

Hon. Secretary-Treasurer: Mr. S. G. Cook *Hon. Auditor:* Mr. G. S. Kirby

Committee: Miss D. M. Martyn, Miss L. G. Voller, Miss R. Coxhead,
Mr. R. H. Greenwood, Mr. N. Dew, Mr. W. R. Mayhew, Mr. D. Sage

Council Delegate: Mr. A. H. Payne

The 1949 session concluded with three talks. Professor K. B. Cumberland addressed a special meeting of the branch in August on 'New Zealand and the Pacific Islands', in September, Dr. H. Bernardelli, Senior Lecturer in Economics, University of Otago analysed one of the current problems of political geography in a talk entitled 'Burma—Success or Failure', and at the October meeting, Mr. D. R. Grey, Lecturer in Philosophy, University of Otago, gave a stimulating account of the geography of the Greek City State.

Arrangements are now being made for the display of the society's publicity material in various townships of Central Otago to encourage new members to join the branch.

GEOGRAPHIC NOTEBOOK

CONTRIBUTORS TO THIS ISSUE. Volume V (1949) of the *New Zealand Geographer* was devoted very largely to the geography of the Pacific and its smaller island territories. The present issue is again given over entirely to the geography of New Zealand. For the first time, however, historical geography appears prominently in these pages. Two articles—one a general survey and the other a more specialised study—are concerned with the earliest years of European influence in New Zealand. Professor Kenneth B. Cumberland, head of the Department of Geography at Auckland University College, contributes the second of a series of articles on the historical geography of New Zealand. The first, published in the United States last year, dealt with the years about 1780. The present article describes and interprets the geography of New Zealand a little over fifty years later. Mr. Gordon Lewthwaite, postgraduate student of geography at Auckland University College in 1949 and now geography master at the Gisborne High School, applies geographic techniques in the examination and interpretation of historical, ethnologic and anthropologic materials with interesting results. His conclusions on the size and distribution of the Maori population a century and a half ago will be of interest to geographers, anthropologists and historians alike.

Dr. R. A. Falla, Director of the Dominion Museum, completes his descriptive survey, begun in Volume IV, Number 2 (October 1948), of the neglected 'outlying' islands of New Zealand. His survey of Chatham Island geography has also its historical section.

The other two articles are concerned with contemporary controversy. Mr. L. Withers of the State Hydro-Electric Department, Wellington, makes an authoritative statement on the present and future of the dominion's hydroelectric power supply, and Mr. David McLeod, high-country sheep farmer of Grasmere, Cass, and Secretary of the High Country Runholders' Association, reviews critically the report of the Commission on the Sheep-Farming Industry published last year.

Among contributors of reviews and of other short notices and comments in this issue are: Professor N. W. Benson, University of Otago and Professor C. A. Cotton, Victoria University College; Mr. C. R. H. Taylor of the Turnbull Library, Wellington and Dr. Gilbert Archey, Director of the Auckland Institute and Museum; Mr. L. L. Pownall, Mr. J. E. Morton and Mr. I. M. Fraser of Auckland University College; Dr. Donald J. Patton, Canterbury University College; Mr. W. I. Shrimpton, Department of Education, Christchurch, and Mr. George Aitken, Department of Education, Auckland; Mr. A. R. Harvey, Auckland Teachers' Training College; and the editorial staff.

HAS NEW ZEALAND A SOIL EROSION PROBLEM? A comparison of that section of the *Report of the Royal Commission on the Sheep-Farming Industry in New Zealand* (Wellington, 1949) relating to soil erosion with the seventh *Annual Report of the Soil Conservation and Rivers Control Council* (Wellington, 1949) reveals a number of striking contradictions.

Among the many startling conclusions expressed by the Royal Commission is the opinion that much of what has been spoken or written on the subject of soil

erosion in New Zealand has been misleading propaganda. The press and public, the commission states, have been duped. According to the report 'erosion' is only a problem to agriculture when deteriorated pasture, or potential deterioration of pasture, results. 'Erosion', it is stated, is a natural and not a cultural force. It cannot be controlled by man. In the opinion of the commissioners, 'erosion' is not, fortunately, a major factor of national consequence to the sheep industry of New Zealand. Such 'erosion' as has occurred is due to 'deterioration and depletion rather than to any [undefined] naturally erosive characteristics of farming in New Zealand'. (Deterioration is defined in the report as the introduction of unpalatable plants into the pastures, such as scrub and fern. Depletion is the reduction in number of all plants of the grassland, both the palatable and the unpalatable species.)

The Royal Commission on the Sheep-Farming Industry recognises that river control (the work of confining a river to a set course) is necessary, but it considers that such control should be conducted by the individual counties and not through a national agency. Local authorities in the form, however, of catchment boards should be abolished as they have no essential functions to perform. The implementation of soil conservation, if and where necessary, should be the responsibility of the Department of Lands. *All* bulletins published by the government on the subject of land and agriculture should be issued only with the approval of the Directors-General of the Departments of Land and Agriculture as many of the publications in the past can be described only as misleading propaganda and not as scientific fact.

In the sphere of conservation theory, the Royal Commission advances some most original opinions. First, it considers that soil conservation and rivers control are *not* integral parts of one problem. Soil conservation, or 'land conservation' as it prefers to term it, is the maintenance of the land in such a condition that it will carry permanent productive pastures. River control is the confining of rivers to set courses so that they will not endanger farm lands or towns and cities. Secondly, the commission points out that care must be exercised to differentiate between 'erosion' and the occasional slips which occur on steep hillsides. These latter, it considers, are due to sudden deluges of water such as cloudbursts and no one knows when or where they are likely to occur. Such slips usually grass over again with time, the report states, and this regrassing can possibly be accelerated by deliberate manuring and sowing of slips.

The report of the Soil Conservation and Rivers Control Council contains a number of statements which conflict with the conclusions of the Royal Commission. According to the report of the Soil Conservation Council, Dr. E. S. Archibald, Director of Experimental Farms, Canada, and Dr. E. C. Holt, Research Specialist, United States Soil Conservation Service, after a comprehensive reconnaissance of New Zealand, 'were amazed at the seriousness of the soil erosion problems in many parts . . . and, in particular, North Auckland, East Coast North Island, and South Island high country'. It is difficult to reconcile the opinion of these two competent North American authorities as expressed before the Seventh Pacific Science Congress and the conclusion of the Royal Commission.

The report of the council gives details of the results of scientifically-planned and carefully-conducted field conservation trials in fifteen areas throughout New Zealand. On the Wither Hills, Blenheim, for example, in a little over four years, carrying

capacity has been doubled on 400 acres of land badly eroded by sheet erosion and gullyng. The success of this experiment, the report states, has been the result of comprehensive conservation treatment—spelling, fire and pest control, control of cattle and sheep grazing, contour cultivation, contour banks, modern pasture management, tree planting, debris dams and adequate fencing and water supply. Conflicting even more directly with the opinion of the commission in matters of soil conservation and rivers control, the council states that the project on the Wither Hills has revealed the beneficial effect on stream flow of comprehensive and inexpensive conservation measures applied over entire catchments. Such a conclusion is not at all surprising in view of similar evidence from numerous overseas countries. In its review of conservation forestry the council reports that headwater control of rivers is the only permanent solution to the problem of river control. Consequently the reafforestation of deteriorating bush country constitutes a major task in the conservation of soil and water resources.

With scientific caution, the report points out that the suitability of overseas conservation practices for New Zealand conditions can be determined only after a period of continuous and precise observation and measurement. In an equally cautious manner, the council considers that 'moderate success' has attended the work of the Grasslands Division of the D.S.I.R., the Department of Agriculture and the Poverty Bay Catchment Board in regrassing trials on slip and flow-eroded land in the Poverty Bay and other areas.

The discrepancies between these and other conclusions in the reports of the Royal Commission and the Soil Conservation and Rivers Control Council are so great as to call for some review of the bases from which the respective conclusions were drawn.

In the preparation of their report, the members of the Royal Commission travelled some 44,000 miles throughout New Zealand and took evidence from some 2,069 witnesses, of whom only 42 were not practising sheep farmers. The technical associates seconded to the commission were from the Departments of Land and Agriculture. There is no evidence either in the composition of the commission itself, in the qualifications of those of its witnesses whose opinions were accepted, or in its published conclusions, which lead one to believe that the commission is competent to express itself blithely upon the theory and practice of soil conservation. It is conceded that the members of the commission have based their conclusions upon the opinions of many practising farmers (often rejecting that of soil scientists and other specialists) and upon their own impressions of the condition of the land. Such sources of information—lay opinions—provide ridiculously inadequate grounds on which to reject scientific evidence accumulated objectively by observation and experiment not only in New Zealand but also in many overseas countries including, in particular, the United States, Canada, South Africa and Australia. If the Royal Commission had contented itself merely with presenting its opinion on the administration of soil conservation in New Zealand, its conclusions may possibly have had some value. To attempt to refute most of the basic facts of the science of conservation on the largely subjective evidence of farmers whose practices—past and present—have been shown to be responsible for our soil erosion problems is to detract from the validity of all the conclusions reached by the commission in this and other spheres. It is inconceivable

that the conclusions of the commissioners on the matter of soil erosion and conservation would ever be accepted by either the government or the general public.—L. L. POWNALL.

PACIFIC ISLAND TERRITORIES. Government reports on New Zealand's Pacific Island Territories could be a useful means of furthering the knowledge of this country's sphere of interest and responsibilities in the southwest quadrant of the Pacific, but the annual reports for the year ended 31 March 1949 serve this need very incompletely. See *Western Samoa*, *Cook Islands* and *Tokelau Islands* (Department of Island Territories, Wellington, 1949). Their statistics of agricultural production, exports, imports, health, education and other pertinent matters are of real value. Their information on economic conditions is insufficient, particularly in the report on the Cook Islands. The reader is given no real picture of agricultural conditions and problems. The land tenure section, too, in this report is inadequate. Legal and administrative information is generally replete, but treatment of the native peoples and the Europeans in terms of the broad and important field of social relations is slight. The report on Western Samoa, containing a good but brief discussion of Samoan society, is a partial exception. There are no maps in the Cook Islands or Tokelau Islands reports, and the single map in the report on Western Samoa omits place names mentioned in the text.

The report on Western Samoa is in general the best of the three, both on the basis of the subjects discussed and the adequacy of treatment. The new political organisation in Western Samoa, effected by the Samoan Amendment Act, 1947, is detailed thoroughly. The Tokelau—latest addition to New Zealand's official possessions and problems in the Pacific—with a combined area of only about 2,500 acres, are dealt with in a first and understandably slender report, but it is to be hoped that future reports will give more information on this remote but interesting outpost of the dominion. Niue is covered in a page or two of the report on the Cook Islands.

In the typical factual manner of government reports, with information carefully compartmentalised under numerous headings, there is little interpretation of the situation report and less discussion of the reasons behind the facts. A general note of official but not fully justified optimism prevails; some major problems facing the peoples of these islands in the present period of postwar change are scarcely mentioned. More utility could be achieved in the presentation of an annual statement on the condition of the island territories by combining the present statistical sections with a more vigorous consideration of local social and economic problems.—D. J. PATTON.

NEW ZEALAND AND ASIA. The chief characteristic of contemporary politics in Asia is the turning of the East on the West, the reaction of colonial nationalism to the former political and commercial dominance of Europeans in this area. The recent world conflict which discredited Europe in the eyes of Asiatics has ensured the ultimate victory of popular leaders in such territories as Indonesia. However, almost all the nationalist leaders have learned their politics from the West and they realise the necessity of European assistance to enable the new nations to take their place in the modern world. Furthermore the urgent need to relieve the pressure of population on

limited resources demands the utmost assistance from more fortunate nations, as much for reasons of self-interest as for humanitarian reasons. New Zealand's long-term policy towards her Asiatic neighbours must clearly be determined by the need for close cooperation and friendships with them.

The Annual Report of the Department of External Affairs, 1948 to 1949 shows that New Zealand has adopted a friendly and tactful attitude to some of the Asiatic statesmen and that the need for economic help is realised. But it may be argued that this is not enough, that New Zealand should adopt a positive programme of active assistance and friendship, and that there is an obvious need for a reconsideration of immigration policy.

It is to be deplored that fear of Communism has tended to blind our statesmen to the real problem in Asia. It is true that in some parts the Communists have succeeded partly because of the failure of other parties to appreciate the problems of the ordinary peasant. For that very reason, many claim, any attempt to halt Communism by military aid to right-wing regimes based on force is doomed to failure. Our friendship should go to those whose strength lies in popular appeal. In the wider field of strategy the chief danger of the tendency to support any anticommunist body lies in the possibility of a Pacific Pact based on revival of Japanese military power. A strong Japan still remains the chief peril in the Pacific for the same reasons that made her an aggressor in the past.—I. M. FRASER.

CLIMATIC SIGNIFICANCE OF TERRACES. The whole question of Pliocene and Pleistocene terraces has engaged the attention of successive congresses promoted by the Union Géographique Internationale, and the sixth report of the committee constituted for their study has been presented to the International Geographical Congress which met in Lisbon early in 1949.

With the title, *Problèmes des Terrasses*, this report has taken the unusual form of an exposition of book length by Professor H. Baulig of Strasbourg, chairman of the committee, of the principles of geomorphology—in so far as he relies on first principles—as the basis of the doctrine of eustatism (changing sea level) which he expounds and defends. As Professor Baulig is one of the soundest exponents of geomorphology, and has done much to clarify and reestablish in Europe the principles on which the science was based by French and American geographers in the nineteenth century, this report is a valuable work of reference which will take its place among the classics. Only one, however, of the important questions raised by it can be dealt with here.

Professor Baulig's remarks have revealed a fundamental disagreement with the German school on the dating of terraces. In point of fact, it remains in doubt whether the river corrasion which led to the abandonment of some valley floors as terraces did take place in glacial stages or in interglacial intervals; and this affects also the dating of gravels which cap the terraces.

According to Huntington's principle, dry periods restrict vegetation to the extent of exposing the land surface to accelerated erosion, resulting in a great supply of waste to rivers. At the same time river volumes are small, and hence there is a high ratio of waste to water in the streams, so that gradients must be built up to greater steepness to carry the load. Thus such periods are in general characterised by aggrad-

ation. Wetter periods, which may alternate with dry, not only increase river volumes but restrict the supply of waste by encouraging growth of vegetation, and especially of forests, on catchment areas.

It is quite possible that the reverse sometimes holds good, perhaps under very diverse conditions; but for the generality of cases the principle of Huntington seems logical. He applied it consistently for his explanation of features resulting from oscillation of climate in prehistoric times in western Asia, as set out in *The Pulse of Asia* and in his major work, *The Climatic Factor*.

Terrace systems in the valleys of some rivers of northwestern Europe indicate alternating phases of aggradation and vertical corrasion—not merely episodes of degradation separated by pauses during which the rivers cut laterally. This is the interpretation adopted by Soergel, which Zeuner follows and quotes in his book *The Pleistocene Period*. Such terraces are especially significant; for there can be little doubt that they mark the effects of climatic oscillation in the Glacial Period.

The rivers affected are not those fed by the meltwaters from glaciers. The alluvia deposited by them are not, therefore, fluvioglacial. Nevertheless an interpretation is adopted by the German workers which requires the phases of aggradation to coincide with glacial ages and the degradational phases to be interglacial. This theory is in agreement with Huntington's principle only if the glacial ages were dry. The German school maintains that this was so, following with the view that it was low summer temperature that conditioned glacial ages. This is a rival theory to that of glacial control by precipitation, advocated, for example, by Simpson, according to which heavy snowfall rather than restricted summer melting has been the cause of the accumulation of ice. Simpson has thought of the same cause bringing on a climax of glaciation in high latitudes and producing a pluvial period in low latitudes.

Baulig's view implies a flat denial, and indeed a reversal of the German theory of the dates of terrace-making in periglacial Europe. He assumes pluvial conditions in glacial ages, and asserts that periglacial rivers were very vigorous, a conclusion not based on the pluvial theory but on objective study of features of the river valleys which he attributes to active corrasion during the last glacial age. He finds freshly incised valleys in which enclosed meanders have become enlarged (ingrown) in the process of incision. He remarks, further, that the rivers have now become underfit, and this he explains as due to the fact that in the postglacial age they have been of reduced volume, implying that precipitation has been greater in glacial ages than in postglacial and interglacial ages. To the onset of drier conditions he attributes the fact that the vigorous river erosion of glacial times has been followed by accumulation of slumped and down-washed waste at the bases of valley sides formerly steepened by undercutting. Much accumulated debris encumbers the valley floors. To evacuate this the rivers, now of diminished volume, must steepen their profiles by aggradation; but the process is as yet only beginning, because the postglacial interval has been very short. This amounts to saying that the postglacial is, and by implication each interglacial age has been, a period of aggradation.

(Professor Baulig has made a further pronouncement on postglacial changes in the rivers of periglacial regions in ('Le problème des méandres'), *Bulletin de la Société belge d'Etudes géographiques*, Tome 17, No. 2, 1948, pp. 103-143. Affirming again that the

rivers have dwindled very appreciably (as proved by the features of their valley-floors) he remarks that precipitation has not necessarily decreased, but river flow in the glacial epoch must have been much more abundant than now because evaporation was small—so small, he thinks, that the run-off would make the volume of the Seine fully double what it now is. River flow, moreover, would be seasonal, melting of winter snows feeding summer floods, all of which would shape the valleys to their needs.)

Comments which Professor Baulig had invited prior to the printing of the report have been published with it. In a comment attention has been drawn to the Soergel-Zeuner contention, and guidance is asked for as to 'whether Pleistocene terracing was due to aggradation of valleys in glacial ages alternating with interglacial degradations or *vice versa*.' Baulig's reply to this, printed in a supplementary pamphlet, is, in free translation: 'There appears to be no doubt that, in the Paris Basin at least, rivers were more vigorous in the glacial epoch than they are today. As the present-day underfitness extends throughout the whole course, even into headwater branches which cannot have felt the effect of the Flandrian aggradation [due to the postglacial rise of sea level], the climatic explanation would appear to be sufficient.'

This amounts to a reaffirmation that aggradational episodes have been interglacial.

A further question asked was whether, if, as Baulig contends, aggradation is now beginning or about to begin, such aggradation may not be attributable solely to deforestation, thus ruling out its climatic significance. The answer which Baulig has given casts doubt on the geomorphic importance of deforestation, at least as it affects northwest Europe, and also questions the universality of the protection it is commonly assumed forest vegetation affords the soil. 'It must not be imagined that virgin forest—with the exception of humid tropical forests—constitutes an absolute protection for the soil. Spontaneous deforestations occur from time to time, resulting from the effects of gales of wind and more especially from fires set alight by lightning and by fallen meteorites. The ravages made by these were the greater because the [virgin] forests were not, like ours, broken up into patches, but were of almost indefinite extent. Forest undoubtedly allows and even favours accumulation of thick soils even on relatively steep slopes, but when it is no longer present this precarious equilibrium is destroyed; and erosion, which operates without restraint for some years, will soon have swept away soils which have been accumulating for hundreds or thousands of years.'—C. A. COTTON.

INDUSTRY AND EMPLOYMENT IN NEW ZEALAND. The *Half-Yearly Surveys of Employment*, (Department of Labour and Employment, Wellington), are of considerable interest and value to students of New Zealand geography. In the survey published in January 1949, in an introductory analysis of the investigations made in the October of the previous year, the Department of Labour and Employment draws attention to several features which have more than ordinary interest.

In the year ending October 1947, of every twelve additional workers undertaking employment (excluding farming, fishing, and hunting), seven entered manufacturing industries, and five entered the tertiary industries. In the next twelve months, two entered the manufacturing, and ten the tertiary industries. At that date 38.5 percent

of the total population of New Zealand was employed. Of this total, 21.8 percent were engaged in farming and other primary industries, 31.5 percent in manufacturing and secondary industries, and 46.7 percent in the tertiary industries—nearly half of the total working population of the country. Only one person in every five in New Zealand today, therefore, can be classified properly as a contributor to the national income.

A feature of the distribution of industry in New Zealand, as shown by the survey, is that the Lower Hutt is the only employment district where secondary industries predominate. In the Wellington district, which is defined as a narrow belt from Wellington to Paraparaumu, there is the smallest proportion of primary industrial workers and the largest proportion of tertiary workers in New Zealand. Wellington, despite the recent programme of decentralising Land and Income Tax Offices, is still characterised by a disproportionately large population of tertiary workers by comparison with other centres. Population statistics for Wellington, though, do accord with the general rule of industrial location in New Zealand that the larger the town the greater the percentage of the population employed in the manufacturing industry. This is accredited to the fact that 'manufacturers in choosing locations for new industries [and one suspects for the extension of existing industries] have tapped the larger pools of labour first'. With the present easing of the acute labour shortage it appears probable, although the survey makes no mention of the possibility, that the policy of developing secondary industries in the smaller centres may lose much of its momentum now that the shortage of industrial manpower has passed its peak. Saturation point for labour has even been reached temporarily in some industries. In any case, the largest cities apparently will retain their relatively high percentage of employees in manufacturing.

The highly seasonal nature of industries processing the primary produce of New Zealand is well demonstrated by the survey. Each summer there is a demand for additional labour to the extent of some twelve thousand workers for the meat, butter, wool and canning industries. This demand is met by smallholders, married women and others entering industry only for a short time under the inducement of seasonally high wages, by the influx of young persons leaving school, and by the supply of student labour over the long vacation.—L. L. POWNALL.

VON HAAST AS A GEOGRAPHER. Professor George Jobberns reviewed *The Life and Times of Sir Julius von Haast* in the *New Zealand Geographer*, Vol. V, No. 1. An autographed copy of this publication has been presented to the society by the author and it is now possible for members to borrow this volume from the librarian. In this connection, the following references are given as a guide to those sections of the book which are more specifically geographic in content.

Many of the notes of Sir Julius von Haast are simply geographic descriptions of the landscape of the South Island, both cultural and natural, in the nineteenth century. His descriptions of the Nelson gold diggings (p. 35), of early sheep stations (pp. 39 and 182), of the Brunner coalfield (p. 93), of the Mount Cook area, (pp. 207 to 211), and of the headwaters of the Rangitata River (p. 177), are examples of his skill in recording the contemporary scene.

Sir Julius von Haast was an explorer of early New Zealand. The discoveries of the Coalbrookdale field (pp. 99 and 100) and of the mountain pass which bears his name (p. 277) are well described, and the production of maps such as that of his Nelson exploration (pp. 105 and 106 and Map 1), and that of the routes between the east and west coasts of the South Island (Map 3) reflects his great ability.

But von Haast was a scientific observer as well as a narrator and explorer. This is shown in his publication of *The Geology of Canterbury and Westland* (p. 828), and in his hypotheses of the formation of the Canterbury Nor'wester (p. 283), the extent of Pleistocene glaciation in New Zealand (pp. 829 and 1029), and the formation of the Canterbury Plains (p. 438). The procedure followed in his studies, which is of methodological interest to the student of geography, is also recorded (pp. 534 to 538).

von Haast wrote widely in geographic publications of his time; in *Petermanns Mitteilungen* (pp. 269, 450 and 992), and in the papers of the Royal Geographical Society (pp. 330, 331, 450 and 506). His familiarity with the writings of contemporary geographers—such men as Karl Ritter (pp. 13 and 1011), and von Humboldt (p. 988) among others—has been noted by the author. The work of Sir Julius von Haast as a geographer culminated in the presentation to him in 1884 of the Patron's Medal of the Royal Geographical Society (p. 853). Such an award was recognition of the contributions of Sir Julius to geographic knowledge in the nineteenth century.

READERS' CHOICE. A short time ago members of the society received, through their branch secretaries, a request to indicate the type of article they preferred to see in the *New Zealand Geographer* by ranking in order of interest and appeal the eight major articles in Volume IV. The results of the voting proved to be of considerable interest and assistance.

In all 175 replies were received—fifty-one from Auckland, forty-eight from Christchurch, thirty-two from Dunedin and forty-four from Wellington. In order of preference the eight articles ranked as follows:

1. R. A. Falla: 'The Outlying Islands of New Zealand'
2. James W. Fox: 'New Zealand and the Pacific:
Some Strategic Implications'
3. Sir Albert Ellis: 'New Zealand Farms and the "Phosphate Islands"'
4. H. A. H. Insull: 'The Solar Salt Undertaking at Lake Grassmere'
5. Robert G. Bowman: 'Land Settlement in New Guinea'
6. L. K. Munro: 'Geography and New Zealand's External Relations'
7. R. Ogilvie Buchanan: 'Geography and the Community'
8. N. V. Scarfe: 'School Geography'

The most surprising feature of this result is the apparent lack of interest in, and demand for, pedagogic articles. This is especially remarkable when one remembers how many teachers, or would-be teachers, of geography are members of the society. From the way these teachers voted one can only conclude that what to teach rather than how to teach appears to be their paramount interest. However it would not be wise on this evidence to exclude articles on pedagogic matters in future, or to conclude that there is no place in the *New Zealand Geographer* for noteworthy comments on the teaching of geography whether in schools, training colleges or the university, or for philosophic discussion of the place and content of the science.

To judge from the way they voted, New Zealanders exhibit an intense interest in their own country, as is only natural, but are becoming more keenly aware of their responsibilities as a nation in the Pacific, and more directly interested in its countries, peoples and problems. Had there been a description of some region within New Zealand, there is no doubt that it would have been highly popular, if comment volunteered by members is any criterion. In short, no matter how crude or subjective this assessment of the interests of readers may have been, the degree of preference very largely vindicates past editorial policy. However, members of the society and readers of the journal must remember that the editors can determine the character of the journal only in that they are in a position to choose articles from those that are submitted to them for publication. When little material is available they can choose only what reaches minimum standards, and when this is barely sufficient in total there is little choice of subject matter. Few editors are able to offer repeatedly a series of articles which satisfies the varied interest of all readers. No editor can do this out of thin air.

OBITUARY. In January of this year the death of Dr. Isaiah Bowman was reported from Baltimore, Maryland, where he was living after his retirement as President of Johns Hopkins University. Dr. Bowman was the outstanding American geographer of his day and generation. As Director of the American Geographical Society of New York, as author of distinguished contributions to geographical knowledge—especially his *New World*—as university administrator, and as adviser to the U.S. Department of State, Isaiah Bowman was known and respected not only in his own country but in the world at large. He never visited New Zealand but through his son, Professor R. G. Bowman, who was visiting lecturer in geography at Canterbury University College in 1940, this society and this country had something of a personal link with him. All members of the New Zealand Geographical Society will regret his passing.

IN OUR CONTEMPORARIES . . .

I. In New Zealand Journals . . .

MAPS AND MAP MAKERS

NEW ZEALAND SURVEY DRAUGHTSMEN'S JOURNAL, Vol. 1, No. 4,
September, 1949.

This journal, first published in 1947, caters specifically for the needs and interests of draughtsmen and computers engaged in various types of survey work in New Zealand. Consequently most of the articles and notes are of a technical nature and, to a layman, rather bewildering in their intricacy. Yet for geographers there is much which is worthy of notice, even though understanding may not be complete. The problems of computation embrace mathematical calculations of a far higher order than the trigonometry of the simple conic projections and elementary field survey which fall to the student geographer's lot.

Computation forms the basis of any and every map that has pretensions to accuracy, and the map is the handmaiden of the geographer, although the latter is only too apt at times to complain of her untidy appearance, of the lies she may tell—of her very uselessness even! So it is rather humbling to read of the great pains taken to ensure accuracy within the limits set by machines and men, to appreciate the immense volume of calculation involved, and to realise how slowly must be traversed the tortuous road from field to printing press.

In the current number of the *New Zealand Survey Draughtsmen's Journal* several items leap at once to the geographer's eye. First and foremost is an article on the mosaic maps produced by the Department of Lands and Survey in collaboration with New Zealand Aerial Mapping Ltd. One of the major problems confronting the geographer in New Zealand is the dearth of maps covering those areas where research can be profitably undertaken, particularly the marginal lands of the central North Island and the South Island high country. These mosaics will help to compensate for this lack since they can be reproduced from existing vertical air photographs more quickly than a topographic sheet can be drawn and published; and where the country has not yet been surveyed from the air, the need to fill gaps will provide the necessary stimulus for priority flights. Nevertheless the production of topographic maps must not be hampered by the desire to put out mosaics by the hundred (three thousand are required for a complete coverage of New Zealand), for topographic maps are indispensable. The difficulty of interpreting surface configuration from mosaics is alone sufficient to emphasise their stop-gap character.

Two series of mosaics are published, one on a scale of 1:15,840, the other on 1:25,000, plotted on the national grid (Transverse Mercator projection). Essentially similar except for scale, both have grid lines and names added in white, and care has been taken to ensure as high a degree of accuracy as possible, for 'it is not possible to produce accurate mosaic maps without large expenditure of time and money for equipment'. Error in scale and area, it is claimed, should not exceed five percent in flat country and ten percent in hilly country.

Here then is one solution to the geographer's problems in back-country areas, particularly if land utilisation be the purpose of his study. The mosaics should be clear enough to pick out fence lines and to distinguish, in broad terms, variations in the vegetative cover. However, cost may prove an insurmountable obstacle—£3 for a mosaic covering fifty square miles is not cheap.

In another note mention is made of a plastic drawing material which, because of its transparency, renders much easier the tracing of data from vertical air photographs. Geographers engaged on land utilisation surveys will appreciate this, as will teachers who build up typical farm plans to illustrate their regional geography courses.

Finally it is a healthy sign to find the Department of Lands and Survey critical of its own deficiencies and alive to overseas developments. In a report of an address given by the Surveyor-General it is pointed out how techniques employed by the Ordnance Survey of Great Britain and by other national surveys are ahead of those used in New Zealand. In particular Mr. Dick mentions the use of type-setting processes on transparencies to achieve absolute conformity in lettering, figuring and symbols, and suggests that the Ordnance Survey practices of selling folded maps in attractive covers and of publishing illustrated catalogues might well be adopted in New Zealand. All geographers will heartily agree, and the extract from the *New Zealand Geographer*, Vol. II, No. 2, which is, in fact, quoted on a later page serves to emphasise the point. Few New Zealanders, indeed, realise that excellent topographic maps of the more accessible areas are published and may be purchased from the Department of Lands and Survey. Many would respond to a lively and intelligent publicity campaign, for as Robert Louis Stevenson once observed, it is impossible to understand the man who is not interested in maps.

A STUDY OF WESTLAND

FARMING IN NEW ZEALAND; WESTLAND: J. R. Shepherd, *New Zealand Journal of Agriculture*, Vol. 79, No. 3, September 1949, pp. 255-266.

This article is a welcome addition to a most informative series of agricultural studies which have appeared at regular intervals in a journal whose appeal extends beyond the farming public. For those who are interested in the New Zealand landscape and in farming practices generally, this study should be most entertaining. The area is still characterised by the pioneer nature of its agriculture and contrasts markedly with many of the earlier studies which have already appeared.

The counties of Buller, Inangahua, Grey and Westland form the agricultural region described by J. R. Shepherd, who is Fields Instructor in the Department of Agriculture at Greymouth. But the student of geography could very reasonably justify calling this area west of the mountain axis, from Karamea in the north to Arawhata in the south, a geographic region; and this article depicts Westland as something more than a land of glaciers, rainforest, coal mines and difficult estuary ports.

Though he follows the general pattern of historical background, relief, climate, soils, land use, pastures, types of farming, transport and markets, production trends by counties, and prospects for the future, Mr. Shepherd has maintained a nicety of perspective, as he shows when he says: 'Since the first days of settlement Westland

has been economically dependent on the wasting assets of gold, coal and timber coal and timber bulk large in the district's economy. However agriculture is filling an increasingly-important role'. Also, 'There are areas capable of considerable improvement under existing economic conditions, and greater areas capable of development but which perhaps would be better left until a later stage in the Dominion's development'; and 'Westland is a young man's district and given young, energetic men with initiative and imagination, it is one which should eventually take its place among New Zealand's primary production districts'.

The student would do well to refer also to the *Statistical Report on Agricultural and Pastoral Production, 1946-1947*, in order to appreciate the relative unimportance, nationally, of the agriculture in Westland, where 5,690,000 acres carried only 97,313 sheep, 20,309 dairy cows in milk, and 47,444 other cattle; and where only six small butter factories served dairying, the major farming industry.

The article is well illustrated by maps showing place names, soil types, and annual rainfall; by climatic and land use tables; and by pictures of rural and urban settlements, of types of relief and of pasture. Two interesting pictures clearly contrast typical natural and cultural elements of the landscape. The caption reads ' . . . it is extremely doubtful whether the breaking in of more virgin country is warranted as yet On many of the early bush-burn areas sheep have retreated in the unequal struggle against second growth . . . ' Attention is drawn to some of the many problems which the district faces, not the least of which is transport. The effects of this last are seen in the high cost of sheep replacements, fertilisers, grain and meal supplements for pigs, costly hauls of livestock to the distant Canterbury freezing works, and the limitations imposed by dependence, over much of the region, on road transport services 'operating over hilly and narrow routes'. This study does revive impressions of the depressing nature of the desolate cultural landscape, of deserted shacks, dredge and sluice tailings, and of a reverting countryside, the whole offset by the grandeur of the native setting—primeval forest and towering ranges, lakes, glaciers and swift-flowing rivers.

—A. R. HARVEY.

2. *In Overseas Journals* . . .

ESSAY IN HISTORICAL GEOGRAPHY

AOTEAROA MAORI: NEW ZEALAND ABOUT 1780: Kenneth B. Cumberland, *Geographical Review*, Vol. 39, No. 3, July 1949, pp. 401-424.

Within its scope this is simply the best brief outline of Maori life as it was in Captain Cook's day that has appeared in print so far. While it is not primarily an ethnological survey, it contains inevitably a very great deal of ethnological material.

Consonant with the interests of its geographical vehicle, this is done probably advisedly, but in so limiting the range of treatment, the author tends to convey to the reader in other countries that the Maori was little better than most other native peoples. Professor Cumberland defines his aim as being 'to describe the "existence together" of phenomena both physical and cultural, to interpret the character of the geographical regions . . . and to recreate its "atmosphere" '.

It is the belief of the reviewer that the Maori was intellectually and culturally among the most capable of aboriginal peoples. But there is no wish to cloud the point by using the present tense in that statement, which would then involve other implications and qualifications.

The treatment in this compact study concerns itself with material matters—crops and cultivation, forest and other resources, trade and exchange, transport and communication. It examines the areal distribution of the people, the nature of their settlements and the size of the population. The maps are especially clear in their demonstration of the location at that time of the individual tribes. It is a pity that the spelling of Ngati Kahungunu is in error in one of these.

The use of the well-selected authorities is careful and critical. There were few reliable observers of the eighteenth-century Maori, and they must be used with discrimination. It is surprising that quotation from Forster, naturalist on the second voyage of Cook, could have been neglected without loss, for his impressions are among the best of all three voyages. But much good reporting has come from early nineteenth century travellers who learned from old Maori whose memories went back to Cook's time.

Where it was relevant to note in passing, Professor Cumberland has discussed the Maori's skill as an artist and craftsman, his concern with magic and ritual in his daily life, his understanding of and deference to natural laws in his use of forest, river and sea. It could have added to the picture to indicate briefly something of the richness of his language in its personification and imagery, the picturesqueness of his legends, the colourfulness and extent of his traditional history, the nature of his cosmogony and religious concepts, and his knowledge of astronomy and navigation.

This is merely the expression of regret that so excellent a study, which is one all students of the Maori will wish to have, could not be more than it purports to be.—C. R. H. TAYLOR.

THE PLANNER'S VIEWPOINT

PLANNING OUTLOOK: Journal of the School of Town and Country Planning, King's College, University of Durham, Vol. 1, No. 2, 1949.

The publication of the new journal *Planning Outlook*, is of interest to students of geography. The geographer is concerned preeminently with the description of areas of the earth's surface. His recognition of the character of particular areas and his techniques of visual representation by maps are two of his major contributions to knowledge. In the past the geographer's interests have been concerned with the description of rural rather than of urban areas. Of recent years, however, and notably in the present century, an increasing number of students of geography have turned to the description of urban landscapes.

The aim of a study in urban geography may be defined as the differentiation and evaluation of areas within a city. It involves a study of the physical environment of the urban area and the distribution of urban land use, the recognition of the pattern of functional areas, the description of the social and economic structure, an analysis of the evolution of the city, and an evaluation of its present character. Thus the

student of urban geography and the town planner have as much in common as do the country planner and the regional geographer. They study the same areas and utilise many similar techniques in research and description. The planner, however, is an engineer and an architect whose major concern is with the future development of areas and the modification of existing features. Like the geographer, the planner recognises the individual character and problems of a specific area, but his interest should lie in taking over where the geographer finishes—at the present.

In the second number of *Planning Outlook* all four articles are of some geographic interest. The first discusses various methods for the production and distribution of electrical power; two maps, of Sweden and Denmark and of Norway are included. Rural settlement in England is outlined in the second with particular reference to the county of Kent, and the graphical representation of values by the use of isolines is discussed in the third article. The paper on the influence of microclimate on planning is the most valuable from a geographic point of view. Here the author discusses firstly the factors influencing microclimatology, and secondly, its effect on built-up areas. None of the papers, however, contributes anything which is factually new to geographic knowledge. One is reminded, though, of how little workers in other fields, and planners in this instance, know of modern geography and of the contributions this discipline can make to their own work. A study of this journal shows how frequently the planner is simply duplicating basic studies which have been made previously by the geographer, and which are immediately suitable for use by the planner. Such duplication arises sometimes largely from a lack of appreciation of what constitutes modern geography. The onus is clearly on the geographer to remove the misconception that geography is concerned with physical features only.

Reviews carried in *Planning Outlook* are detailed, and students of geography who are interested in rural and urban development will be interested in the planner's viewpoint as illustrated by this new journal.—L. L. POWNALL.

REVIEWS

A HISTORY OF MAORI CULTURE

THE COMING OF THE MAORI. By Te Rangi Hiroa (Sir Peter Buck). Wellington: Whitcombe and Tombs Ltd., 1949, pp. 548.

One needs to have confidence in a man's sense of humour to tell him, as Professor Worley told Dr. Peter Buck at the Auckland Museum Council's farewell party over twenty years ago, that he was leaving his country for his country's good. The remark received a responsive smile, and the recipient has been justifying it ever since.

It was a bold foresight that persuaded him to go; a realisation that, as science is in one aspect a going back over the path of experience to make sure, ethnology calls for a retraversing of the fields of geography and the paths of history, if the courses of events are to be determined and origins discovered. How very fortunate it was that one so eminently qualified by race, training and genius should have been offered this opportunity, the *Coming of the Maori* is ample evidence.

His revisits to New Zealand have been less frequent than could have been wished, but there has been the satisfaction and pleasure of receiving from his pen a series of notable ethnographic studies (which might have been called 'baskets of knowledge' but for his severe handling of this supposed vehicle of higher understanding) from Aitutaki and Manihiki, from Tahiti and Tongareva, and from Samoa and Mangaia, all of which gave authority, if any one should have thought it needed it, to *The Vikings of the Sunrise* of 1938. This book, after clearing the way to an understanding of the Polynesian migration route into the Pacific, led the way to the several island groups of Polynesia, returning in each case to Raiatea in the Tahitian group identified as the point of departure of the different colonising migrations.

With *The Coming of the Maori* the *kaumoana toa* returns to his home, and how eagerly his return was awaited, and how much what he has to tell concerns his Maori as well as his pakeha kinsmen, is seen in the complete disposal by the publishers of the first edition within six weeks. It will have a new and refreshing flavour for many readers of Maori life and history, the piquant tang of criticism—criticism not of conduct but of credulity, of belief in false gods that have crept into the traditional pantheon. It commences with a straight-forward narrative of age-dimmed myth and legend, leading forward to traditions that, gradually assuming more definite shape, finally become securely linked with what may be regarded as historical. Te Rangi Hiroa gives us no formal essay on anthropologic principles. Nevertheless, his first chapter already introduces, unobtrusively as if part of the story itself, a quiet checking of facts and an almost lighthearted, but none the less critical, enquiry into legend, that together reveal a method pervading the whole work. Even if 'myths are myths, and, like axioms, require no proof', legends need, and are given, more critical scrutiny, while native stories and European explanation are alike interrogated in the light of versions current in other parts of the Pacific, and are checked against the 'irreducible and stubborn facts' of physical anthropology and material culture.

The Vikings of the Sunrise told the general story of the peopling of the South Pacific; in *The Coming of the Maori* there is presented for the first time a full account of the history and development of the New Zealand sector of Polynesia. But it is still a

story of Polynesia, and in it one sees how essentially Polynesian the Maori is. Much dead wood has been cut away—of hypothetical racial intrusions, of far-fetched art-affiliations, and of 'borrowed' techniques, as well as of false gods. For instance, the long-accepted early Melanesian settlement of this country has been disposed of. The legendary description on which it rested dissolves into inconsistencies under close scrutiny, and the supposed support from cultural and linguistic affiliations is held to be unsubstantiated. The biologic facts, the anthropometric data, affirm the long-established physical unity of the Polynesians, all of whom share equally in any elements that may be regarded as Melanesian.

If Sir Peter criticises legend it is not to destroy but to evaluate and thereby to apply more surely, and this enhanced authority gives new interest to the traditions he now gathers, together with the facts of geography, of natural history, and of archaeological discovery in New Zealand, into a well-knit story of the stages of Polynesian occupation; first of chance discovery, later of unplanned, but not unwitting, voyages that resulted in settlement, and finally of the deliberate migrations of the 'Fleet' six hundred years ago.

Buck shows how natural resources exercised their influence, as, for instance, on location of settlement. The still extant flocks of stout wingless moa, more abundant in the South Island, attracted the empty-handed drift-voyagers, the *tangata whenua*, to establish their homes there. That the North Island was by no means neglected is suggested by unusual Northland types of carving apparently of considerable age, though some reservation may be necessary with respect to these.

For all that they had originally been cultivators the first comers seem not to have domesticated any native plants; they remained hunters and gatherers. Nevertheless the stern apprenticeship of necessity enforced the exploitation, for food and raw materials, of all the resources of forest, plain, sea shore and coast. When the Toi adventurers of the tenth century arrived they were probably not slow to follow the well-tried adaptations of the *tangata whenua*; nor, as the author suggests, would the Fleet migrants, notwithstanding their newly-brought food plants, have remained superior to local experience.

A division of the book that in less able hands could have slipped into matter of fact routine is the extensive Book II on material culture. But here again Sir Peter Buck proceeds beyond the given object, through the technique of its manufacture, to a distinction between what the Polynesian brought from his homeland and what the Maori invented in Aotearoa. All through, the material facts are enlivened as well as explained with apt anecdote and pertinent legend, and it is certain that in years ahead, many present readers who refer to a page for the checking of a point will re-read a chapter.

The last chapter, 'The Creation of Creators', deals with the discovery in New Zealand—a surprise to Maori and pakeha alike—of a supreme god Io, supposedly related to corresponding concepts in Polynesia. The author shows that the latter are non-existent, while the main doctrine is an attempted unification of the story of Genesis with elaborations typical of, but by no means belonging to, Maori mythology. He concludes, 'It is too closely allied to the Christian teaching of heaven and hell to have originated in an ancient house of learning before European contact'.

Although some chapters end with a note of whimsical regret at the passing of the old ways, this nostalgia is not vain repining at the inevitable, but a reminder to the author's Maori kinsmen that while the former beliefs and customs served their day, newer ideas, to which the Maori as well as the pakeha, should contribute, must now be heeded.

Te Rangi Hiroa's new book is a *waka wananga*; it is 'The Coming of the Maori' in a double sense, a vessel of all the migrant voyagings of Polynesians to New Zealand, freighted not only with the great personalities of Maori history but also, now at last, with understanding and a revealment of the mainsprings and rationale of Maori life.—GILBERT ARCHY.

A HISTORY OF SOUTH ISLAND LAND USE

THE INVASION OF NEW ZEALAND BY PEOPLE, PLANTS AND ANIMALS:

THE SOUTH ISLAND. By Andrew Hill Clark. New Brunswick: Rutgers University Press, 1949, pp. 465.

A scientist working on any problem and presenting his findings to his colleagues and the general public need not concern himself unduly with defining the precise compartment of the system of knowledge into which his work most precisely fits. Dr. Clark, therefore, justifiably leaves to others the task of naming the 'taxonomic pigeonhole' into which his book, *The Invasion of New Zealand by People, Plants and Animals*, should be placed. The reviewer, however, has the task of indicating to prospective readers the nature and content of the work under review. He cannot adopt the indifferent attitude of the author; he must try and state clearly what the book is about and what it achieves; he must face what, in this case, is a most difficult problem.

Dr. Clark's full-length, admirably-produced and adequately-illustrated statement is quite unusual in its scope and content. It is doubtful if anyone has ever done for any region of similar size what Dr. Clark does here—not for New Zealand, as the title on both the dust-jacket and spine would suggest—but for the South Island. It is the sort of book which in content might have been compounded by an author with the multifarious interests—if not the specialised knowledge—of Robert McNab, Ernst Dieffenbach, G. M. Thomson, Guthrie-Smith, P. W. Smallfield and Robert Cushman Murphy. It is at once reminiscent of all these. There is carefully-documented early history (especially of the first half of the 19th century); there are skilful attempts to describe and interpret the life and landscape of the South Island in the early days of settlement; there are detailed accounts of the transformation of the vegetation, soils and drainage patterns of the South Island through the decades of rapid development; there are expert and detailed accounts of the origins and growth of agricultural patterns and practices and a most useful summary of contemporary land use and land problems; and finally there is behind all these the concern which almost all enlightened North Americans have for the natural resources of the new lands and the understandable conviction that their conscientious conservation is imperative. There can be few books into which such variety is so expertly crammed. The only regret that New Zealanders will have is that Dr. Clark did not have the opportunity of doing for the whole of New Zealand what he has done for the South Island. Many

will regard it a pity that, since the larger task was out of the question, he could not have chosen the (in this sense) relatively neglected North Island instead of the South, the cultural origins of which have more frequently attracted the attention of competent scholars and the traditions of which have always been prouder and more carefully preserved.

The book is concerned with New Zealand culture origins and especially with the origins of patterns and practices of land use. It is a history of these practices—of the stock, crops, grasses, pests, fences, shelterbelts, woodlots and detailed farm procedures. But it is a history that no New Zealand historian has ever attempted—perhaps ever conceived. One is tempted to suggest, with due humility, that this is history as only a geographer could write it. Dr. Clark modestly hopes that his work will 'introduce students to some problems in the historical geography of the South Island'. There is no other introduction as adequate as this within the covers of one book. It will become indispensable reading for students and teachers not only of history and geography but also of New Zealand agriculture, social anthropology and sociology. Yet the book is more than an introduction. Dr. Clark answers many questions more effectively than they have been answered before, and his interpretations and conclusions are always fresh and stimulating.

Chapter headings, while not even hinting at the variety of their content, at least provide an indication of the eminently satisfactory arrangement of material. There is a short introductory chapter on the physical habitat, followed by a group of three on the pre-1840 history of European contacts, on the flood of settlement after 1840, and on the growth, distribution and regional origins of population. Sheep, cattle, minor domestic animals and animal pests are each given a chapter and most readers will find these the most valuable and original in the book. In the next section five chapters have the following headings: The Place of Plant Husbandry; Potatoes; Wheat; Brassicas, Grasses and Clovers; Exotic Trees and Shrubs. Dr. Clark's thesis is presented again in the Conclusion. There are two brief appendices, thirty pages of reference notes, and a bibliography of twenty-four pages and over 600 items. The volume is abundantly illustrated with maps, photographs and tables, although many of the maps and photographs could have been better. There are occasional minor mis-statements of fact, which any editor in New Zealand would have corrected, and now and again American phrases which are awkward to New Zealand eyes and ears. Yet this book will have a high place in New Zealand scientific literature for a long time to come. It is one of the most important books on New Zealand published in a generation.

—KENNETH B. CUMBERLAND.

NEW ZEALAND'S GREATEST MOA SWAMP

PYRAMID VALLEY. By Roger Duff. Christchurch: Association of Friends of the Canterbury Museum, 1949, pp. 48.

This is so fascinating and so finely produced an account that one could wish it were a little longer. It is the record of excavations organised by Mr. Duff, now Director of Canterbury Museum, at Pyramid Valley, fifty miles northeast of Christchurch. The site is a swamp paddock which in 1941 was found to be the richest moa ground yet known; here numerous specimens of four species of moa have succumbed over a

long period to bogging by swamp, the area yielding, it is estimated, 800 skeletons per acre. *Emeus crassus* is the most numerous, followed by the six to twelve foot high *Dinornis maximus*, and in smaller numbers, the thick-legged incredibly clumsy *Pachyornis* and *Eurapteryx*. The scientific results from Pyramid Valley are of highest importance; the confusion between *Pachyornis* and *Eurapteryx* has been straightened out; and the first egg of *Emeus crassus* obtained, pieced together from over two hundred fragments by the late Edgar F. Stead. Most important, a picture of the ecology of the moa begins to emerge. Accompanied by other flightless birds such as the giant wood-hen (*Aptornis*), the flightless goose (*Cnemiornis*) and the takahe (*Notornis*), the moa replaced the old world ungulates as the dominant grazing and browsing animals on tussock grassland, bush and scrub from the mountains to the sea. In Mr. Duff's words, 'Canterbury was once as suitable for moas as it is today for sheep'.

Pyramid Valley marks a new step in the relation of the museum to its public; those who collaborated with the author in photography and design are deserving of the fullest credit, and there cannot previously have been issued from New Zealand museums anything that was better produced. To say that the treatment is short is not a criticism; it is rather the reverse. Geographers and naturalists will look to an expanded Canterbury Museum to do still more for the field natural history of the province. In particular more must be heard from Mr. Duff on the arresting problem of the moas' decline and extinction, whether it was due to fire or natural cataclysm, to the depredations of *Harpagornis*, especially against chicks, or even to hidden internal causes such as endocrinal arrhstic effects which may have spelt the doom of more than one race of vertebrate giants.—J. E. MORTON.

MUSTERER'S TALE

HIGH COUNTRY DAYS. By Peter Newton. Wellington, A. H. and A. W. Reed, 1949, pp. 198.

This, Peter Newton's second book, was written 'with the object of giving praise and publicity to those who follow a life of isolation and hardship'. It describes in twenty chapters various events which might take place in the course of a season's mustering in high country. It is illustrated by some well chosen photographs and simple line drawings showing how to rope a horse, shear a sheep, or hold a calf for marking.

Newton is one of the few who have succeeded in presenting to outsiders an accurate picture of a life unfamiliar to them. From long experience his knowledge is unrivalled and his observation of detail enables him to paint a vivid picture of a scene. One can see the cattle crossing a river, the string swept into a big bow by the current; weary musterers lying under the birch trees while a bush robin hops among the sleepers; and the little mob of sheep huddled in the moonlight as two keas sweep down.

Speaking of the early morning climb in the shearing muster he says: 'As they progressed the country opened into great carpet-grass basins, grey shingle faces, crisscrossed with the tracks of deer and chamois and, showing golden in the first rays of the morning sun, towering ragged peaks'. Again in the cattle muster: 'In most of the pakihi the riders disturbed little lots of hinds and their calves. The calves, four and five months old and still spotted, bounded as light as thistledown as they

raced behind their mothers for the shelter of the bush'. How well high-country farmers knew these scenes, and what a pleasure it is to recall them! Unfortunately, all the writer's knowledge and experience, all his observation and sincerity, have been overweighted by the style of writing which he is developing. He has abandoned the simple language of reminiscence which made *W'ayleggo*, his first book, so attractive, and has tried to impress his readers with a mixture of stilted phrases and grandiloquence. Throughout the book it is difficult to find a passage which is not over-written. He is at his best when he is describing scenes of action; but even here he has allowed awkward and old-fashioned phrases to spoil the naturalness of his description. The writing of propaganda is always a delicate business and a high degree of skill is needed to make it unobtrusive.

He has emphasised the hardships of the life in order to give praise to those who willingly endure them, but in the opinion of the reviewer in so doing he has drawn all his characters too noble.

It is difficult to stomach the perfection of courage, endurance and conscientiousness of all these men; even the boss is so full of wisdom that he is too good to be true. A little honest vice and stupidity would seem more natural. It would be wiser to let the truth tell its own story rather than risk overdrawing the characters in order to produce an effect.

In spite of Mr. Newton's statement that the book is intended for those in other walks of life, it will appeal most to those who know the scenes; they, at least, are really genuine, and not even over-ambitious language can destroy their charm. Unless he is prepared to study the art of writing more seriously, no amount of knowledge or sincerity will make his presentation of the high country attractive to the majority of readers.—D. McLEOD.

FOR PEDAGOGUES AND OTHERS

ATLAS OF GEOGRAPHY. By Kenneth B. Cumberland. Christchurch: Whitcombe and Tombs Ltd., 1949, pp. 72.

NEW ZEALAND IN OUTLINE: A PICTORIAL GEOGRAPHY. By Kenneth B. Cumberland. Christchurch: Whitcombe and Tombs Ltd., 1949, pp. 84.

This atlas, designed particularly for New Zealand and Australian schools, needs no introduction to the educational world. Since its first appearance in 1941 it has become increasingly and deservedly popular in post-primary schools. Dr. Cumberland has taken the opportunity offered by the publication of this sixth edition to make certain alterations and additions aimed at bringing the atlas up to date and more in line with modern developments in what is a constantly changing subject.

The first striking change is in Map 1, in which the map of the world on Mercator's projection showing major air routes has been replaced by a map on the equidistant azimuthal projection centred on Wellington—a much more realistic 'air-age' map. In conformity with modern practice, Map 12—Major Regions of the World—has been replaced by a map showing World Climatic Regions based on the Köppen system of classification.

In the New Zealand section Maps 20 and 21 have been completely revised and enlarged. The new maps are excellent examples of the use of circles to depict statistical

information, Map 20 the capacity of hydroelectric stations (potential and installed) and Map 21 the tonnage of vessels entering main ports (total and overseas). In the remaining sections seven new relief maps have been introduced giving more detail of areas within the continents.

The net result of the various changes has been to increase the number of maps by eight and to enhance even further the merit of this popular atlas.

Geography as a teaching subject probably presents greater opportunities for the use of visual methods than any other subject in the school curriculum. Furthermore it is a truism to say that the best way to appreciate the characteristics of a region is to study it 'on the ground'. When we leave the local region, however, our first-hand knowledge must be replaced by a study of map, of pictures and of accurate verbal descriptions of the scene. In New Zealand, pupils' geographic knowledge has of necessity been acquired almost entirely through the third of these media. But a change has taken place. Topographic maps have recently become more readily available and now comes *New Zealand in Outline: a Pictorial Geography* to provide a carefully selected and arranged group of photographs of the New Zealand scene.

As its title suggests, the essential feature of the book is its one hundred and twenty illustrations. Of these, nine are maps and the remainder photographs, the majority of which are ordinary ground photographs each depicting some important aspect of the geography of our country. The text has been built around these illustrations, thus giving an 'impressionistic and selective', rather than a complete systematic treatment of the subject. Although the topics dealt with are influenced by the photographs that were available, this has not in any way dictated the general pattern of the book.

After a brief description of the natural setting, the climate and the vegetation, almost half the volume (with fifty of the one hundred and twenty illustrations) is devoted to agricultural geography. The other major section deals with power resources and industry (twenty-four illustrations) and the book is rounded off with brief chapters on transport, the people, towns and recreation. The text is restricted to somewhat less than half the total space, and with the exception of short introductory paragraphs to each chapter, consists of descriptions of the photographs and explanatory notes to elaborate the subject of the illustration.

Teachers who have attempted to collect their own supplies of pictures will appreciate the detailed, careful work that must have gone into the compilation of this excellent photographic record of New Zealand geography. To take one example: the story of sheep farming is told in thirteen pictures, the first a typical farmstead, followed by more detailed views of stock, mustering, yarding, shearing and droving. Finally there is a group of six photographs illustrative of activities associated with high-country sheep farming.

The size of the photographs varies from full-page (eleven by eight inches) to very small (four inches by two and a half inches). In a publication where the pictures are designedly the chief medium of communication it is a pity that the conflicting claims of text and illustration (in a book whose size is limited), have necessitated the inclusion of any as small as this. Fortunately their numbers are few. Into the text the author has compressed an amazingly complete summary of the geography of New Zealand in a

clear, lucid style. Although it is not a regional geography, the characteristic features of the main geographic regions are clearly indicated.

In format *New Zealand in Outline* is a companion volume to the author's *Atlas of Geography and Map Reading in Geography*. It is printed on excellent art paper, and the typography, lay-out and reproduction of photographs are of a very high standard. The general reader, the geographer, and the teacher of senior classes in postprimary schools will welcome this first-class contribution to the gradually expanding body of our geographic literature.—F. R. G. AITKEN.

THE GEOLOGY OF NEW ZEALAND

GEOLOGICAL MAP OF NEW ZEALAND. With descriptive booklet *The Outline of the Geology of New Zealand*. By Officers of the Geological Survey. Wellington: Government Printer, 1948, 2 maps and pp. 47.

Geographers and geologists alike will welcome the publication of this very useful map. Its two sheets, each approximately thirty-six by thirty inches, are drawn on a scale of sixteen inches to the mile. The distribution of the various geological formations is indicated by twenty-two distinct colour tints displayed in clearly bounded and numbered areas, whilst the abundant geographic names are printed in dark grey in positions chosen so as not to obscure geological detail. The map was prepared by the Chief Draughtsman to the Geological Survey, Mr. A. W. Hampton.

In the descriptive booklet Mr. Wellman has summarised the present knowledge and current views concerning the highly varied and complex developments of Palaeozoic rocks which are confined to the South Island. Mr. Willett deals more briefly with the Lower Mesozoic series which occur in both islands. The longest contribution is that of Dr. Finlay and Dr. Marwick who deal with the Cretaceous and later sediments, in the palaeontological examination of which they have been most active for more than twenty years. They have dealt with a vast amount of material representative of many portions of the dominion, much of it collected by officers of the Geological Survey, members of the staffs of oil-investigating companies, or by private workers. Their description and charting of the distribution of the many subdivisions amongst these rocks now recognised by them will be very welcome to New Zealand geologists. A brief summary of the characters and distribution of the igneous rocks is given by Mr. Reed. Short bibliographies attached to each section of the booklet add greatly to its usefulness.—W. N. BENSON.

TEACHING AIDS

THE FILM STRIP AND PROJECTOR MANUAL. By A. W. Reed. Wellington: A. H. and A. W. Reed, 1949, pp. 82.

At a time when visual aids are so popular in educational circles, Mr. Reed's booklet on the film strip and projector will be read with considerable interest. It arrives at an opportune moment when there is considerable discussion on the relative merits of the various visual aids, especially the film strip and the cine film. Most teachers, probably, will agree with the author's contention that 'if a choice has to be made between motion pictures and still films, it is the latter which should win the day.' As

Mr. Reed says, the film strip and its projector are cheap, portable and, above all, simple—although he quite rightly warns users against the dangers of misuse arising out of this very simplicity. In writing this book, it is the *users* that the author hopes to assist so that they may get the best from this type of visual aid.

The booklet discusses such topics as the film strip and its place in education generally, the mechanism of the projector, the work of the operator and lecturer, the many types of activity in which film strips may be used, slides and colour films, the purchase and care of the projector and equipment, and the use of the film strip in all types of schools.

There is good material in those chapters dealing with film strips in the school and in religious education, but it is rather a pity that the author does not include here more detail as to how a film lesson should be taken. This is the sort of thing that would appeal to teachers in general and especially to teachers in Sunday Schools, many of whom have had little, if any, specialised training.

On the whole, this is a very helpful little book, and any school, organisation or private person possessing or thinking of purchasing a film strip projector would find a copy of Mr. Reed's manual most useful.—W. I. SHRIMPTON.

AN AMERICAN TEXT

A TEXTBOOK OF GEOMORPHOLOGY. By Philip G. Worcester. New York: D. Van Nostrand Company, Inc., 1948 (Second edition), pp. 584.

This is a new edition of a useful textbook which made its first appearance in 1939. It is one of those books which sensibly treat geomorphology as a geological study: though, as the author has stated in his original preface: 'While only an occasional student will ever become a professional physiographer, thousands may become interested in the subject and gain enduring pleasure from continued studies of their physical environment, wherever they may be. This is very much worthwhile!'

The book has grown in length by nineteen pages, and the number of illustrations has been increased by ten. The lists of references include the titles of some works published since the first edition was printed, but there are notable omissions. Jaggar's attractively illustrated *Volcanoes Declare War* and Williams's *Calderas and Their Origin*, both of interest to New Zealand readers, are now listed.

As is to be expected in a book written in Colorado, topographic features of the American West are cited freely as examples. Alaska, New Zealand, and the European Alps are called upon for illustrations of glaciers, but the mountains of Colorado can provide glaciated landscape forms.

The treatment of volcanism is strictly geological, quite as much so as in geology textbooks, stressing processes rather than resulting geomorphic features. Forms such as endogenous domes and associated spines are explained, but there is no mention of erosion features peculiar to volcanoes, of volcanic interference with normal drainage (except for one brief reference), or of the relief forms produced by lahars and *nuées ardentes*. Calderas are briefly dismissed, and New Zealand is still cited as a lava-plateau region.

Features of tectonic relief, notably fault scarps, are dismissed with very scanty description, and in the section 'Diastrophic Mountains' the impression is conveyed

(though unintentionally, no doubt) that 'folded' mountains owe their altitude to folding paroxysms some of which date back to the Palaeozoic era.

The treatment of the peneplain assumes downwearing on traditional lines, and the problem of the survival of remnants of several successively developed surfaces of planation in some regions is avoided; but it is perhaps too soon yet to look for the impact of Lester King's recent hammer blows on the downwearing theory, which seem to be demolishing it, at least as applied to the surface of Africa.

Having devoted more attention in his first edition to the 'scablands' of the Columbia River region than is usually accorded them, the author has refrained from adding a reference to the glacial explanation of these which has been put forward by Hobbs.

The almost empty page following the references to 'Islands and Coral Reefs' might have been partly filled by some mention of recent writings on coral reefs, especially as this edition, like the first, devotes ten pages to this subject (though without any reference to Murray's important theory of outgrowth of coral over talus). Islands and coral reefs are inexplicably separated by several chapters from coastal features, which are tucked away as a sequel to a chapter on lakes. This is perhaps understandable in a book written for dwellers in the interior of a continent; and the features of oceanic coasts are included here. It is a pleasure to read in a textbook (for once) that 'subsidence is not necessary for the formation of a fiord'.

The allowance of six pages for description and discussion of submarine canyons seems almost lavish, seeing that many better understood features of the actual land surface have received very summary treatment.

But enough of this carping criticism! In spite of a few minor defects, this is a good book.—C. A. COTTON.

GEOGRAPHY AND AMERICAN HISTORY

THE HISTORICAL GEOGRAPHY OF THE UNITED STATES. By Ralph H. Brown. New York: Harcourt, Brace and Company, 1948, pp. 596.

This work, completed just before the author's untimely death, is the culmination of his many years of research in the historical geography of the United States. It is the first broad treatment of the historical geography of the country.

An effective presentation of the historical geography of an area as large and varied as the United States, whose earliest white settlement dates from 1565 poses a severe organisational problem. Strictly speaking, the historical geography of an area is the geography of that area at one or more points in past time. But the author clearly recognised the impossibility of presenting, within the scope of a single readable volume, several complete cross sections of the country at different times in the past. Dearth of material for certain areas and times, moreover, rules out such a procedure. Ralph Brown's solution was to study some sections of the country in more detail than others, and to consider the more recently settled parts during only one period. Selection of area seems to have been dictated at least to some extent by availability of source material. The work should not be read, consequently, with the expectation of finding a comprehensive treatment of the entire country at one or more periods in the past.

The initial phase of the work is concerned with the new European settlements in America. A more detailed consideration of the Atlantic seaboard in 1800 follows, but the author's discussion of the geography of the settled, eastern part of the United States in 1800 is by no means evenly balanced or complete. The southern states and New England are treated in considerable detail, but the middle Atlantic states are unmentioned except for an introductory chapter. Once west of the Atlantic seaboard, the author gives us the historical geography of each region or state as it comes into prominence for the first time during the nineteenth century wave of westward movement across the continent. Midway across the continent he stops to give a brief review of the United States in 1870, with an eastward glance over the older settled areas and a view westward toward areas most of which were still beyond the frontier of effective occupation by the white man. In turn appear the historical geographies of the Great Plains and the far western areas.

Happily the states and regions west of the Appalachians are viewed over a span of one or more decades during the pioneer era rather than from a single point of time. Strict adherence to the literal interpretation of historical geography often fails to portray a picture of rapid change and instability which may be highly important features in the earlier geography of an area. In the studies of the Atlantic seaboard in 1800, moreover, the author repeatedly presents comparisons with the earlier geography of the same area, in what Hartshorne has termed 'comparative historical geography'.

One of the most important contributions of the book is its constant pointing of the contrast between what various parts of America were like and what people thought they were like. In the author's opinion, fancies and misconceptions concerning America were potent factors in shaping the actual use and misuse of the land.

Documentation is at a minimum, on the plea that an over-documented text is too distracting to the reader. The book is profusely illustrated with maps and sketches. The prose of Ralph Brown, who was certainly one of the most literate of American geographers, is a delight to read, and his vividness of description and explanation is enhanced by well-chosen selections from eye-witness accounts. He has combined the knowledge and approach of the geographer with the sources and methods of the historian to reconstruct the geography of America in former times, and his work comprises a signal contribution to the understanding of the present geography of the United States.—DONALD J. PATTON.

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The New Zealand Geographical Society was founded officially in Wellington towards the end of 1944. Its real foundation, however, took place in Christchurch in 1939 when a group of enthusiasts formed what is now the Canterbury Branch of the Society. Their lead was followed in February 1944 in Wellington, and further branches came into being in Auckland and Dunedin early in 1945.

The aims of the Society as stated in the constitution are 'to promote and stimulate the study of geography'. These are the aims of more than one Society in the world and the New Zealand Geographical Society is particularly concerned with geography in New Zealand. It is therefore the Society's policy to stimulate geographic studies of New Zealand and matters closely related to the Dominion.

The Society undertakes the publication of a journal which at present appears twice a year. Branches of the Society organise lectures, study groups, and excursions, and encourage their members to prepare matter for publication in the Society's journal, the *New Zealand Geographer*. Contributions from overseas writers and those who are not members of the Society are also encouraged.

Membership of the Society is open to all persons interested in the aims of the Society. Full details of membership will be sent on request by the Secretary, New Zealand Geographical Society, Department of Geography, University of Otago, Dunedin, N.Z.

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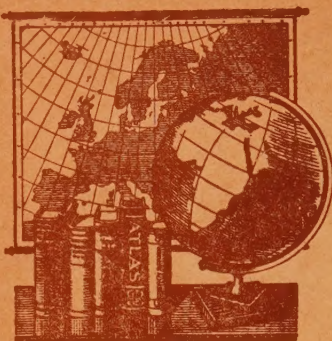
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